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WAR MACHINE

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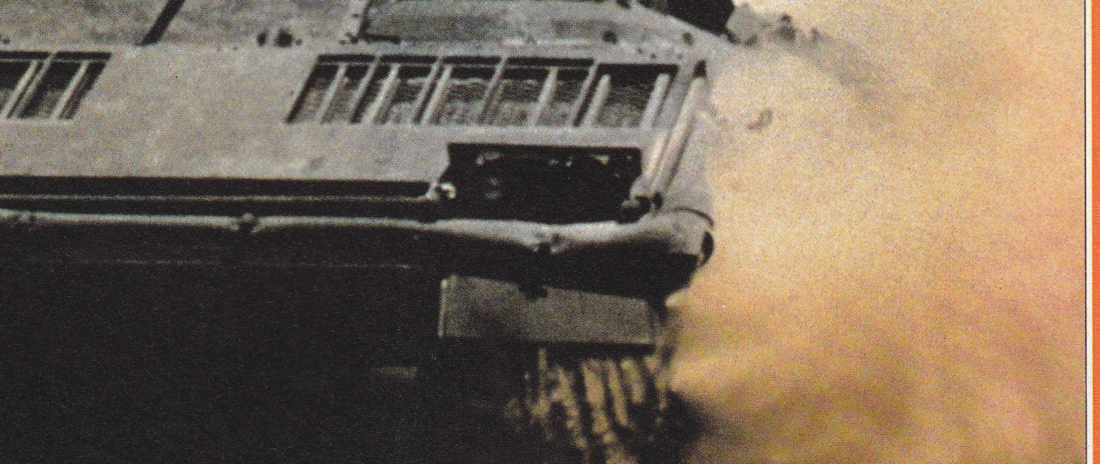
Armed Forces of the World: US Naval Aviation (Part 3)



Soviet BMPs in Operation

M113 in Action

Development of the APC to the IFV

A fully illustrated guide to Modern Tracked Infantry Vehicles

WAR MACHINE

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Volume 4 **Issue 43**

CONTENTS

Modern Tracked Infantry Vehicles

Development of the APC to the IFV 842
AMX-10P mechanized infantry combat vehicle 844
AMX VCI infantry combat vehicle 844
FV432 armoured personnel carrier 845
MCV-80 infantry combat vehicle 846
VCC infantry armoured fighting vehicle 846
Marder mechanized infantry combat vehicle 847
Pbv armoured personnel carrier 847
MOWAG Tornado mechanized infantry combat vehicle 848
M113 in Action 849
M2 Bradley Infantry Fighting Vehicle 854
Armoured Infantry Fighting Vehicle 854
Type 73 armoured personnel carrier 855
Steyr 4K 7FA armoured personnel carrier 856
M-980 mechanized infantry combat vehicle 856
BMD airborne combat vehicle 857
BMP-1 mechanized infantry fighting vehicle 857
Soviet BMPs in Operation 858
BTR-50PK armoured personnel carrier 860
MT-LB multi-purpose tracked vehicle 860

Armed Forces of the World

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WAR MACHINE

Forthcoming issues feature:
- Japanese Aircraft Carriers of World War II
- Modern Light Vehicles
- Modern Destroyers
- Anti-Tank Guns of World War II
- Post-war Jet Fighters
- Modern AEW Aircraft

Modern Tracked Infantry Vehicles

Arising out of a need for infantry to accompany tanks in action, the armoured personnel carrier has for a long time been little more than an 'armoured bus', delivering infantry to the battlefield where they fought on foot. In recent years, however, a dramatic change has taken place, with the evolution of the infantry fighting vehicle.

Modern infantry play a key part in the combined arms concept of mechanized warfare that also includes tanks and reconnaissance vehicles, artillery, anti-tank systems, engineers, logistic support and army aviation. In order to keep up and operate with tanks the infantry has to be carried in tracked or wheeled armoured vehicles. Some countries, for example France and the Soviet Union, have a mix of wheeled armoured personnel carriers and tracked armoured personnel carriers/mechanized infantry combat vehicles. The former are cheaper to build and operate, and have greater strategic mobility as they can travel at high speeds on roads. The full-tracked vehicles, on the other hand, normally have much improved armour protection, greater cross-country mobility and heavier armament than their wheeled counterparts.

In the 1960s armoured personnel carriers such as the M113 were introduced that were only armed with a 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun in an unprotected mount to provide suppressive fire while the infantry dismounted and fought on foot. The more modern mechanized infantry fighting vehicle (or infantry fighting vehicle as it is also called) not only has improved armour protection but is usually fitted with a turret-mounted weapon that can range from 20 mm (for example the West German Marder and French AMX-10P) right up to 73 mm (the Soviet BMP). It also has a co-axial machine-gun to engage softer targets, and some even have anti-tank guided weapons on their turrets so that they can also engage enemy tanks. In addition the embarked infantrymen are provided with firing ports and vision devices to enable them to engage unprotected infantry as the vehicle crosses the battlefield, although the actual value of this feature is open to debate. The modern personnel carrier of whatever type also has a full range of night-vision equipment for the commander, gunner and driver and an NBC system to enable it to operate on a contaminated battlefield; and in most cases it is fully amphibious.

Very often the armoured personnel carrier is the basic member of a whole family of vehicles that share many components, with obvious cost and logistical advantages to the user.

In a number of recent conflicts in the Middle East, tanks have tried to fight alone without the use of mechanized infantry. In almost every case they have failed: without the infantry, tanks cannot always take their objective, and moreover (perhaps even more important) if they do take it they cannot subsequently hold it against an all-arms counterattack.

The years since Independence have seen Israel's army become possibly the most highly mechanized in the world. In order for infantry to support the tank forces, Israel operates the M113 in numbers second only to the United States.

The M113 has become the most widely used personnel carrier in the world, with more than 50 nations operating the vehicle. Since 1960 more than 75,000 have been produced, with new models still being developed. It has seen action many times, most notably in the Middle East and with the US Army in South East Asia.

Development of the APC to the IFV

The mobile battlefield which has been evolving since the end of World War I has required the infantry to match the mobility of other arms. For most of that time, the armoured personnel carrier has delivered the soldier to the front line, but combat has still taken place on foot. Recent developments, however, have concentrated on allowing infantrymen to fight from specially developed vehicles alongside the tanks.

Although the M2 Bradley IFV is now being introduced into the American army the M113 will remain in service well into the next century. At present some 20,000 are in use in a wide variety of roles. The M113 above (operated by the 1st Cavalry) is accompanied by two M577 command posts during Exercise 'Reforger '83'.

Once the German advance in the early days of World War I had been brought to a halt, static warfare rapidly became the norm and advances in most cases were subsequently measured in very short distances at the cost of tens of thousands of men killed and wounded. The arrival of the British tanks in 1916 dramatically reduced the losses of the infantry, for these new vehicles could normally cross the battlefield swept by machine-gun fire and shell splinters, overcome German trenches and barbed-wire entanglements, and finally neutralize machine-gun positions. The infantry normally followed as close to the tank as possible but was still vulnerable to machine-gun and rifle fire that had not been neutralized. When the tanks had punched a hole in the German defences, which were normally constructed in depth, the idea was that the horsed cavalry would then follow through and exploit the breakthrough. But this rarely happened, the cavalry and its horses proving even more vulnerable to enemy weapons than the infantry.

In 1917 the British used a number of tanks in the supply role to carry up to the front line urgently-needed supplies of ammunition and food, and sometimes they were used to carry troops forward as well. In the following year a Mk V tank was modified specifically for use as a troop carrier, its side sponsons being removed and the vehicle being fitted with sliding doors and seats. Similar conversions were carried out on other marks in France during the same year, and some examples were used in the troop-carrying role in the Battle of Amiens during August 1918. The main drawback of these conversions was that the troops normally arrived in no condition to fight, for on leaving the vehicle they had no clear idea of the surrounding area and the two engines of the tank were both noisy and gave off fumes that made them sick. The end of the war brought any further development of troop-carrying vehicles to a close and from then on, in Allied eyes at least, the tank was seen mainly as an infantry support vehicle.

In the 1920s and 1930s the major powers carried out considerable experiments with mechanized forces on different scales, with perhaps the Soviet Union, the UK and Germany taking the lead. These mechanized forces normally comprised tanks, tankettes, infantry carried in lorries and towed artillery weapons and anti-aircraft guns. Some countries also started the development of tracked vehicles for towing the artillery, and some self-propelled artillery weapons were also designed. The main role of the infantry was still seen as it being taken as near to its objective as possible in trucks, whereupon it would dismount and follow the tanks on foot.

The Germans, however, fully understood the requirements of mechanized force and not only developed tanks and mobile assault guns but also half-tracked armoured personnel carriers to carry the infantry and its equipment. These highly mobile forces could outmanoeuvre Allied units in France in 1940, and with close co-operation from Stuka dive-bomber and other aircraft, quickly neutralized any enemy in their path. It is widely thought that all German forces were mechanized with armoured vehicles by the early part of World War II, but well into the war many German units still relied on horses to pull their artillery. The rapid expansion of the German army in the late 1930s had not been matched by sufficient numbers of the trucks and other equipment needed in large numbers by true mechanized forces.

The Soviet Union completely neglected armoured personnel carriers during World War II, although machine-gun carriers were in service on a large scale when Germany invaded in 1941. These lacked the armour protection and firepower necessary to ensure their survival on the intense battlefield of the early days of the war, and they soon disappeared from front-line use to relegation as artillery-towing vehicles and supply carriers.

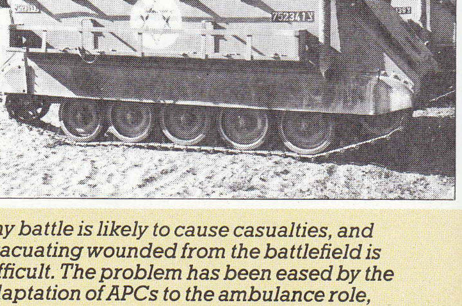
By the time the United States entered World War II the half-track armoured personnel carrier was already in production and this was subsequently issued on a wide scale, not only to the United States but also to the Soviet Union and other Allies including the United Kingdom. Over 40,000 of these vehicles were built in countless configurations, including self-propelled anti-aircraft gun systems and tank destroyers, to name but two. Today, over 40 years after the last half-tracks left the production lines, the type is still used in many parts of the world, Israel being the largest user. The main drawbacks of the half-track were that its front axle was unpowered, which limited its cross-country performance, and that its open-topped troop compartment left the infantry vulnerable to small arms fire and shell splinters.

To enable troops to be carried under fire, Canada took turrets off Ram tanks and converted them into armoured personnel carriers, which were first used during the assault on Boulogne in 1944 with the name Ram Kangaroo. So successful were these vehicles that similar conversions were carried out on 105-mm (4.13-in) M7 Priest self-propelled howitzers (subsequently called the Priest Kangaroo) and Sherman tanks (Sherman Kangaroo).

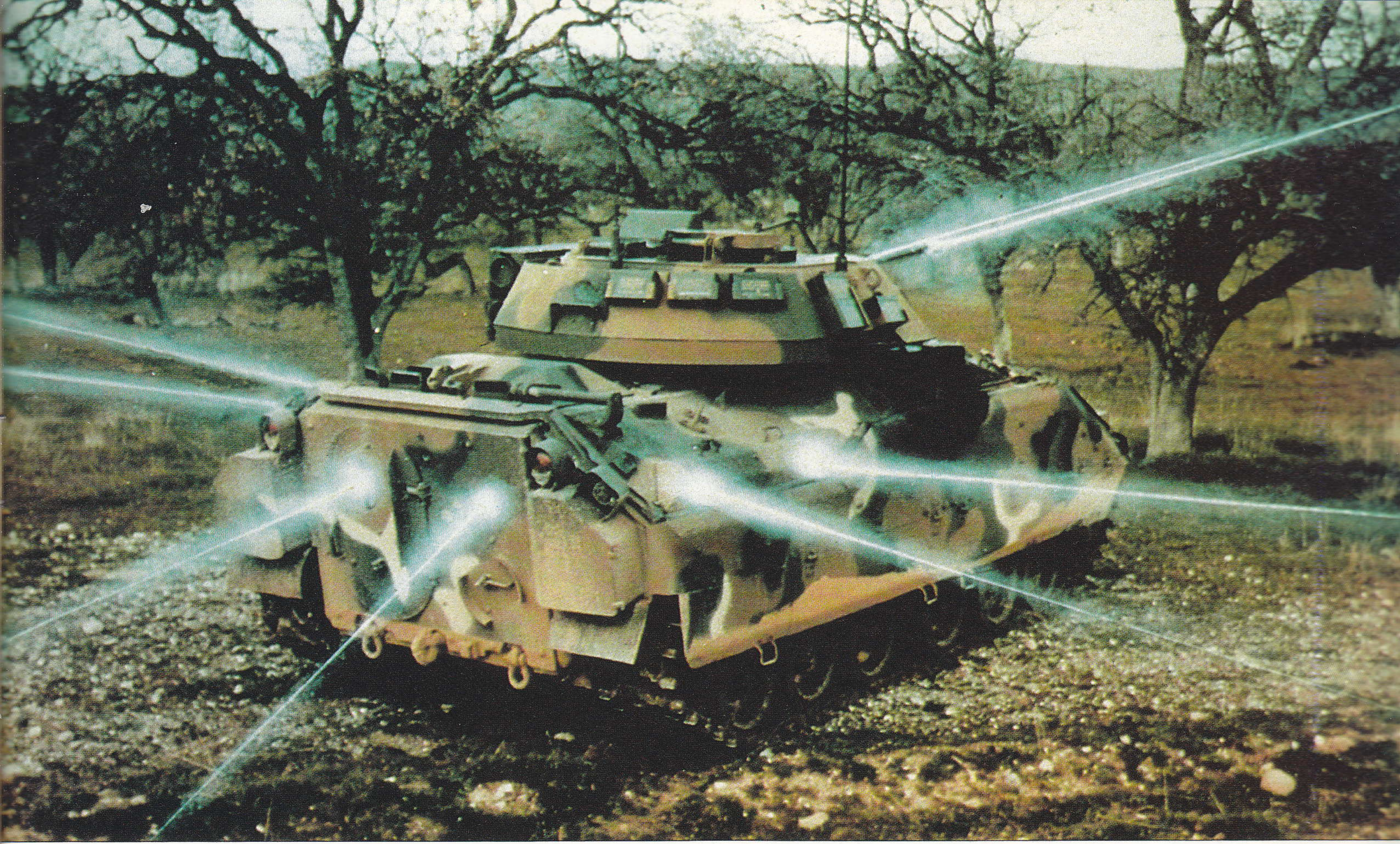
For much of World War II the British army used the Bren Gun Carrier, mainly to carry the mortars and machine-guns of infantry battalions, although there were developed numerous specialized versions such as flame-thrower vehicles, command/radio vehicles and observation post vehicles. Half-tracks were also introduced later in the war, but there were never enough to go round.

World War II finally dispelled any remaining doubts that the infantry should be carried only in unarmoured trucks, and most of the major powers soon started the development of armoured personnel carriers.

Most of the armoured personnel carriers de-



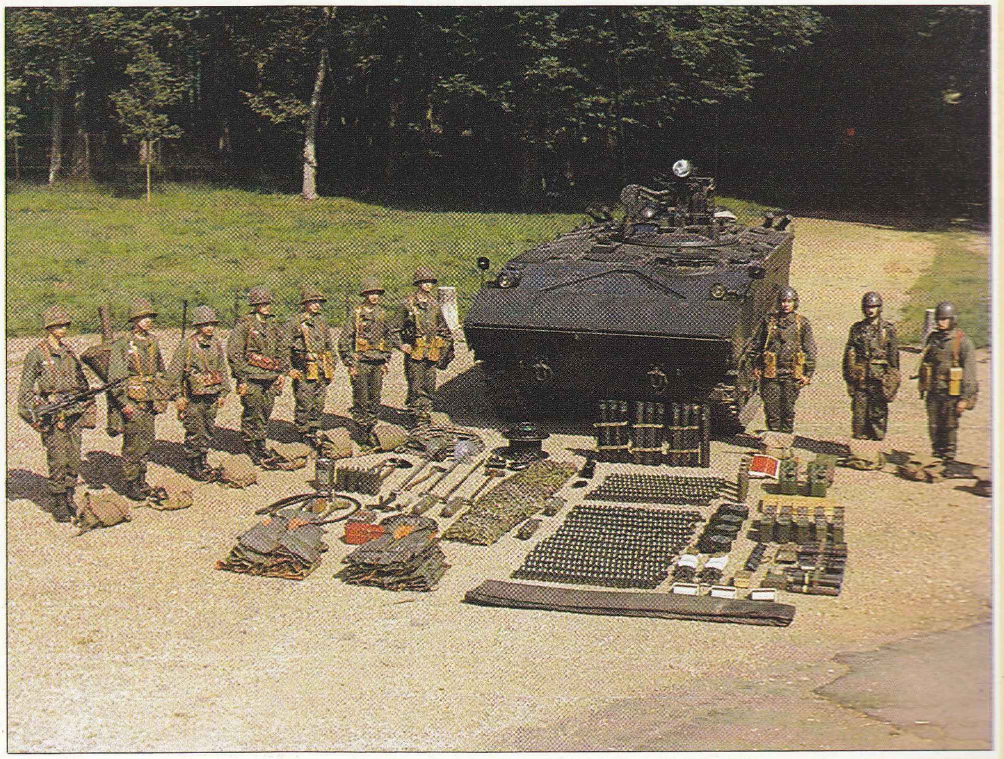
Any battle is likely to cause casualties, and evacuating wounded from the battlefield is difficult. The problem has been eased by the adaptation of APCs to the ambulance role, demonstrated by an Israeli medical evacuation version of the American M113A1 APC.



The M2 Bradley allows infantry to fight from within the protection of their vehicle. This retouched photograph indicates the ports for 5.56-mm (0.22-in) rifle fire, together with the main 25-mm weapon with co-axial 7.62-mm (0.3-in) machine-gun. With TOW anti-tank missiles mounted on its turret, the Bradley has the potential to tackle everything from infantry on foot through light armoured vehicles to main battle tanks.

veloped up until the 1950s were designed mainly to transport the infantry across country, where it dismounted to fight on foot. These APCs were normally provided with sufficient armour protection to protect the crews and troops from small arms fire and shell splinters, and were armed with a 7.62-mm (0.3-in) machine-gun in an unprotected mount.

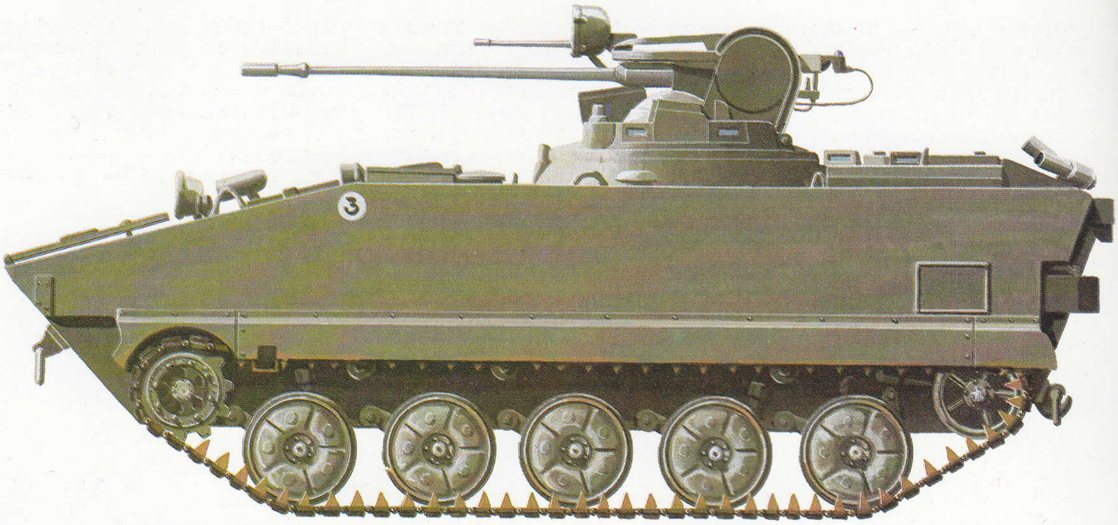
By the 1960s and 1970s, the requirement had changed and new vehicles such as the West German Marder and Soviet BMP started to emerge. Not only did these have much superior armour protection, but also feature provision for the troops to fire their weapons from within the vehicle if so required, thereby enabling a rapid rate of advance to be maintained. They are also fitted with more powerful weapons, a 73-mm (2.87-in) 'Sagger' ATGW launcher in the case of the BMP, and a 20-mm cannon in the case of the Marder. The provision of more powerful armament has enabled such MICVs (or IFVs) not only to engage enemy troops but, more important, other armoured vehicles on the battlefield, especially the enemy's armoured personnel carriers. The 25-mm cannon of the M2 Bradley infantry fighting vehicle and the 30-mm cannon of the new British MCV-80 will not only defeat any Soviet vehicles of this type but also penetrate the side armour of main battle tanks. The 'Sagger' ATGW of the BMP and TOW of the M2 Bradley enables the vehicle to engage enemy tanks before the latter can, in theory, engage the missile-firing vehicle. The new-generation vehicles such as the M2 and MCV-80 are, however, much more expensive than the vehicles they are replacing or supplementing (the M113 and the FV432), and they will never replace these vehicles on a one-for-one basis. The new vehicles normally have an NBC system enabling them to operate in an NBC-contaminated area, and also a full range of passive night-vision equipment to enable their crews to see and fight in darkness.



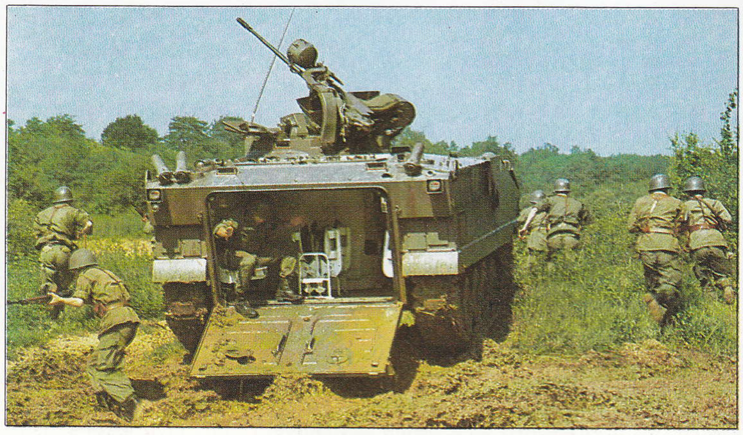
The AMX-10P MICV typifies modern personnel carriers. With a driver in front, together with a gunner and commander in a two-man, 20-mm-armed turret, the vehicle carries eight fully-armed troops as well as MILAN anti-tank missiles. Also typical is the way in which the original vehicle has been adapted to a variety of roles, ranging from ambulance through artillery observation to fire support.

FRANCE

AMX-10P mechanized infantry combat vehicle



Above: The AMX-10P has a two-man power-operated turret armed with a 7.62-mm (0.3-in) machine-gun and a dual-feed 20-mm cannon. In the future it is probable that the latter will be replaced by a 25-mm weapon, which will have improved penetration characteristics against more recent vehicles.



Right: French infantry dismount from the rear of their AMX-10P MICV, which forms the basis for a complete family of vehicles including command post, HOT anti-tank, mortar tractor, fire control, artillery observation, repair vehicle, ambulance, radar and fire support.

The **AMX-10P** is the replacement for the AMX-VCI, and was designed by the Atelier de Construction d'Issy-les-Moulineaux in the mid-1960s, production being undertaken from 1972 at the Atelier de Construction Roanne (ARE), where production of the AMX-30 MBT is undertaken together with that of the AMX-10RC (6×6) reconnaissance vehicle which is automotively related to the AMX-10P even though it is a wheeled vehicle. First production vehicles were completed in 1973, and since then more than 2,000 vehicles have been completed for the French army and for export to countries such as Greece, Indonesia, Mexico, Qatar, Saudi Arabia and the United Arab Emirates.

The AMX-10P has a hull of all-welded aluminium, with the driver at the front left, engine to his right, two-man turret in the centre and troop compartment at the rear. The eight troops enter and leave the vehicle via a power-operated ramp in the hull rear; there is a two-part roof hatch above the troop compartment. Apart from the roof hatches and two firing ports in the ramp, there is no provision for the troops to use their rifles from within the vehicle. The power-operated turret is armed with a 20-mm dual-feed (HE and AP ammunition) cannon with a co-axial 7.62-mm (0.3-in) machine-gun; mounted on each side of the turret are two smoke-dischargers. The weapons have an elevation of +50° and a depression of −8°, turret traverse being 360°. Totals of 800 rounds of 20-mm and 2,000 rounds of 7.62-mm (0.3-in) ammunition are carried.

The AMX-10P is fully amphibious, being propelled in the water by water-jets at the rear of the hull, and is also fitted with an NBC system and a full range of night-vision equipment for the commander, gunner and driver.

Variants of the AMX-10P include an ambulance, a driver training vehicle, a repair vehicle with crane for lifting engines, an anti-tank vehicle with four HOT ATGW in the ready-to-launch position, an **AMX-10PC** command vehicle, a RATAC radar vehicle, artillery observation and fire control vehicles, an **AMX-10TM** mortar tractor towing 120-mm (4.72-in) Brandt mortar and carrying 60 mortar bombs, 81-mm (3.19-in) fire-support vehicle and the **AMX-10 PAC 90** fire-support vehicle. The last has already been adopted by the Indonesian marines and has a GIAT TS-90 two-man turret armed with a 90-mm (3.54-in) gun, for which 20 rounds of ammunition are carried, and a 7.62-mm (0.3-in) co-axial machine-gun. As with most turrets today, a wide range of options is offered including an anti-aircraft machine-gun and various types of fire-control equipment. In addition to its three-man crew of commander, gunner and driver, the AMX-10 PAC 90 carries four infantrymen in the rear. The vehicles delivered to Indonesia have improved amphibious characteristics and they are meant to leave landing craft offshore rather than just cross rivers and streams, as is the basic vehicle. Indonesia also took delivery of a number of AMX-10Ps with the original two-man turret replaced by a new one-man turret at the rear armed with a 12.7-mm (0.5-in) M2 HB machine-gun.

Specification

AMX-10P

Crew: 3+8

Weight: 14200 kg (31,305 lb)

Powerplant: one HS-115 V-8 water-cooled diesel developing 280 hp (209 kW)

Dimensions: length 5.778 m (18 ft 11 in); width 2.78 m (9 ft 1 in); height (hull top) 1.92 m (6 ft 4 in) and (overall) 2.57 m (8 ft 5 in)

Performance: maximum road speed 65 km/h (40 mph); maximum range 600 km (373 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.70 m (2 ft 4 in); trench 1.60 m (5 ft 3 in)

FRANCE

AMX VCI infantry combat vehicle

To meet a French army requirement for an infantry combat vehicle Hotchkiss, which is no longer involved in the design, development or production of vehicles, built a number of prototypes in the early 1950s, but these were all rejected. It was then decided to build an IFV based on the chassis of the AMX-13 light tank, which was then already in large scale production for both the French and other armies. Following trials with prototype vehicles, the **AMX VCI** was adopted by the French army, first production vehicles being completed at the Atelier de Construction Roanne in 1967. Since then some 3,000 vehicles have been built for the home and export markets. Once the Atelier de Construction Roanne (ARE) started to turn out the AMX-30 MBT, production of the AMX-13 light tank family, including the VCI, was transferred to Creusot-Loire at Chalon-sur-Saone, where the VCI remains in production today at a low level. The French army currently calls the vehicle the Vehicule de Combat d'Infanterie (infantry fighting vehicle), although it had a number of earlier names. In many respects the VCI was an advance on other Western vehicles of its period as not only was it fitted with a machine-gun turret for suppressive fire, but the infantry could also use their rifles from within the vehicle. The major drawback of the VCI was its lack of amphibious capability, and when originally deployed it was not fitted with an NBC system or night-vision equipment. The VCI remains in service with the French army, although it is being replaced by the AMX-10P, and is also used by Belgium, Ecuador, Indonesia, Italy, Morocco, Venezuela and the United Arab Emirates.

The AMX VCI is of all-welded steel

AMX VCI infantry fighting vehicle of the French army fitted with a cupola mounted machine-gun. The troop compartment at the rear of the hull is provided with firing ports. In the French army this is now slowly being replaced by the amphibious AMX-10P MICV.

construction, with the driver at the front left, engine to his right, commander and gunner in the centre and the troop compartment at the rear. The last are provided with doors in the rear, and hatches in the side are provided with four firing ports each. Torsion-bar suspension consists of five single rubber-tyred road wheels, with the drive sprocket at the front and idler at the rear; there are four track-return rollers.

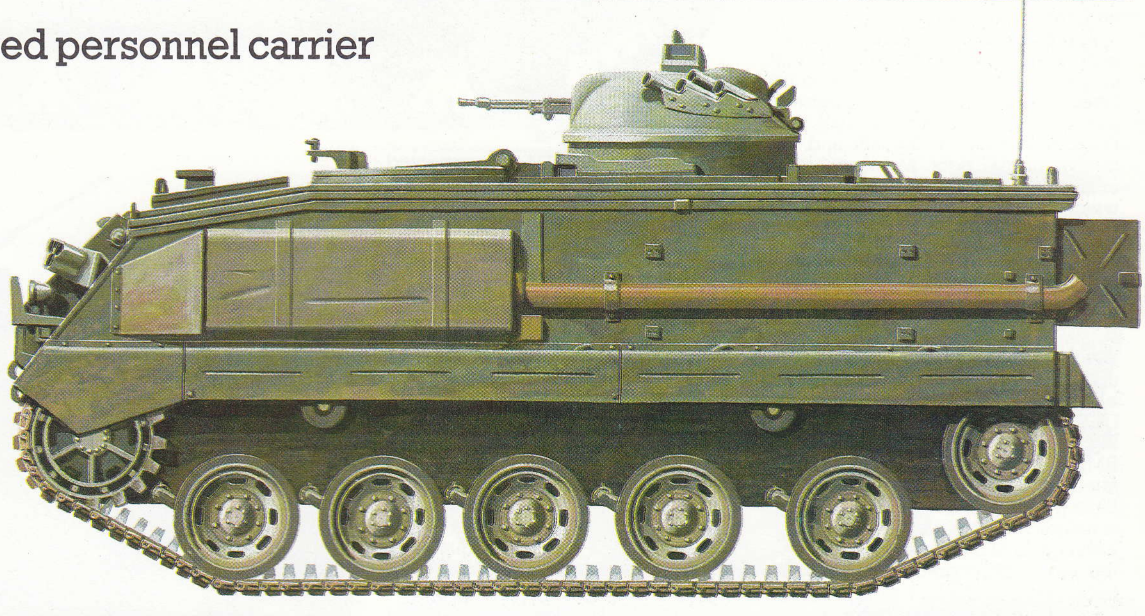
In addition to the basic VCI, which carries 10 fully equipped troops as well as its three-man crew, there were also ambulance, command, cargo, combat engineer, anti-tank (with ENTAC wire-guided missiles), RATAC radar, artillery fire-control, mortar-carrier (both 81-mm/3.19-in and 120-mm/4.72-in weapons) and support vehicles, the last carrying the remainder of the gun crew and additional ammunition for the 155-mm (6.1-in) Mk F3 self-propelled gun.

More recently the manufacturer has offered a diesel conversion package for the VCI and all other members of the AMX-13 light tank family. In this the original petrol engine is replaced by the well-known Detroit Diesel 6V-53T engine developing 280 hp (208 kW) for improved operational range, slightly higher speed and reduced fire risk.

Specification
AMX VCI
Crew: 3+10
Weight: 15000 kg (33,069 lb)
Powerplant: one SOFAM 8-cylinder petrol engine developing 250 hp (186 kW)
Dimensions: length 5.70 m (18 ft 8 in); width 2.67 m (8 ft 9 in); height (hull top) 2.1 m (6 ft 11 in) and (overall) 2.41 m (7 ft 11 in)
Performance: maximum road speed 60 km/h (37 mph); maximum range 350 km (218 miles); fording 1.00 m (3 ft 3 in); gradient 60 per cent; vertical obstacle 0.65 m (2 ft 2 in); trench 1.60 m (5 ft 3 in)

UK

FV432 armoured personnel carrier



An FV432 fitted with a Peak Engineering one-man turret armed with a 7.62-mm (0.3-in) machine-gun and four electrically-operated smoke dischargers on either side. When fitted with this turret the roof hatches over the troop compartment cannot be used. The FV432 is in service only with the British army.

After the end of World War II various prototypes of full-tracked armoured personnel carriers were built in the UK, but it was not until 1962 that one of these, the **FV432**, was accepted by the British army. The FV432 is member of the **FV430** series of vehicles which also includes the **FV433** Abbot 105-mm (4.13-in) self-propelled gun built by Vickers at its Elswick facility in Newcastle between 1964 and 1967. Production of the FV432 and its many variants was undertaken by GKN Sankey between 1963 and 1971, about 3,000 being built in all. Although offered overseas it was never purchased by any country as by that time the very similar American M113 APC was already in volume production for the US Army, and this was much cheaper than the FV432. For a short period the FV432 was commonly known as the **Trojan**.

The basic role of the FV432 is to transport British infantry across the battlefield; when close to its objective the infantry dismount and continue the assault on foot. The main difference between the M113 and the FV432 is that the latter has a hull of welded steel construction while the former has a hull of welded aluminium. The driver is seated at the front on the right, with the commander to his rear and the power-pack to his left. The troop compartment is at the rear of the hull, with entry to this compartment via a large single door in the hull rear. Hatches are provided over the top of the troop compartment, but there is no provision for the infantry to use their weapons from within the vehicle. The 10 infantrymen carried are seated five on each side of the hull facing each other on seats that can be quickly folded up to enable cargo to be carried. The vehicle is fitted with night-vision equipment and was also one of the first vehicles of its type to be fitted with an NBC system, which supplies clean air to the troops and crew. When introduced into service the FV432 was fitted with a flotation screen attached to the top of the hull; when this was erected the vehicle could propel itself across lakes and rivers with its tracks. These screens have now been removed as they were easily damaged and prone to damage in time of war from small arms fire and shell splinters. The basic vehicle is fitted with a 7.62-mm (0.3-in) machine-gun in an unprotected mount, but many vehicles have now been fitted with a turret-mounted 7.62-mm (0.3-in) machine-gun over the troop compartment.

In addition to being used as a troop carrier, the FV432 is also used for a wide range of other roles including ambulance, command with extensive communications equipment installed, 81-mm (3.19-in) mortar carrier, minelayer towing the Bar minelaying system and fitted with the Ranger anti-personnel mine scatter on the roof, radar carrier (such as the ZB 298 surveillance radar or the Cymbeline mortar/artillery-locating system), artillery fire-control vehicle with the Field Artillery Computer Equipment (FACE), and specialized vehicles for the Royal Signals. The maintenance carrier is called the **FV434** and can change Chieftain engines in the field, while the anti-tank member of the family is the **FV438** which has Swingfire ATGWs. From the late 1980s the FV432 will be replaced by the MCV-80.

Specification
FV432
Crew: 2+10
Weight: 15280 kg (33,686 lb)
Powerplant: one Rolls-Royce K60 6-cylinder multi-fuel engine developing 240 bhp (170 kW)
Dimensions: length 5.251 m (17 ft 7 in); width 2.80 m (9 ft 2 in); height (with machine-gun) 2.286 m (7 ft 6 in)
Performance: maximum road speed 52.2 km/h (32 mph); maximum range 483 km (300 miles); fording 1.066 m (3 ft 6 in); gradient 60 per cent; vertical obstacle 0.609 m (2 ft 0 in); trench 2.05 m (6 ft 9 in)

An FV432 APC at speed. In many respects this vehicle is similar to the American M113, but it has steel rather than aluminium armour and, as built, was fitted with a multi-fuel engine and a complete NBC system.

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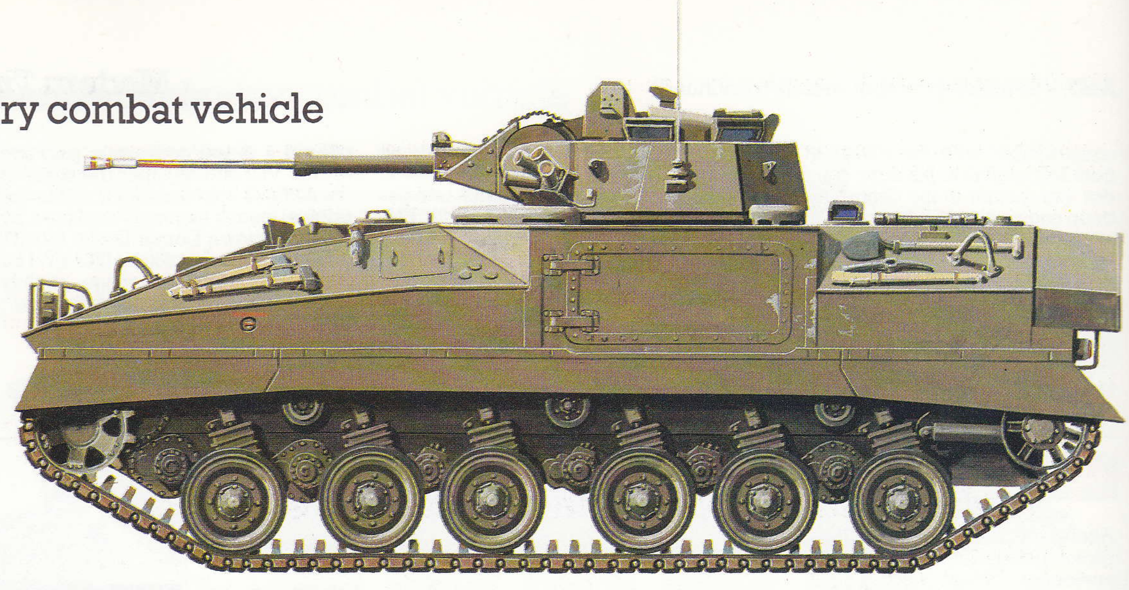
UK

MCV-80 infantry combat vehicle



Above: The GKN MCV-80 is expected to enter production for the British army in the near future in order to supplement the FV432 APC. It is fitted with a two-man power-operated turret armed with a 30-mm Rarden cannon and a 7.62-mm (0.3-in) co-axial machine-gun.

The **MCV-80** infantry combat vehicle has been developed to meet the requirements of the British army by GKN Sankey, which built all of the FV432 series of vehicles which are currently used to transport infantry in the British Army of the Rhine. After exhaustive trials with prototype vehicles, early in 1984 the British Ministry of Defence ordered the MCV-80 into full-scale production, and first deliveries are due to be made in a few years' time. Compared with the FV432 the MCV-80 has greater armour protection, mobility and firepower.

The hull of the vehicle is all-welded aluminium, with the driver at the front on the left and the powerpack to his right. The two-man power-operated turret is in the centre of the hull, with the commander on the left and the gunner on the right. Main armament comprises a 30-mm Rarden cannon which is already in service with the British army in the CVR(W) Fox light armoured car and the Scimitar, which is a member of the CVR(T) Scorpion family of vehicles. Mounted co-axially with the main armament will be a Hughes Helicopters 7.62-mm (0.3-in) Chain Gun which will be manufactured under licence in the United Kingdom by the Royal Small Arms Factory (RSAF) at Enfield in North London. Unlike the American Bradley and Soviet BMP series, the MCV-80 will not be fitted with an ATGW as the British believe that anti-tank warfare is best left to a dedicated vehicle. The troop compartment is at the rear of the hull, and the eight infantrymen leave via two large doors in the hull rear. Over the top of the troop compartment are roof hatches, but there is no provision for the infantry to aim and fire their weapons from within the vehicle as is the case with the American M2 Bradley, West German Marder and Soviet BMP. There is ample room in the vehicle to carry sufficient supplies of food and ammunition for a 48-hour period. Suspension is of the torsion-bar type with six road wheels, and the drive sprocket is at the front with the idler at the rear; there are three track-return rollers. The MCV-80 is not amphibious as this was not a requirement of the British army; it is fitted with an NBC system and a full range of night-vision equipment.

In addition to the basic IFV armed with a 30-mm cannon, it is expected that a number of more specialized versions will enter service with the British army, including a platoon vehicle with a turret mounted 7.62-mm (0.3-in) machine-gun, a recovery vehicle, an 81-mm (3.19-in) mortar vehicle, an engineer vehicle, a forward repair vehicle and an artillery command post vehicle.

GKN Sankey believes that the basic chassis is suitable for a wide range of other applications, especially for the export market, and is now proposing a complete family of vehicles including a light tank with a turret-mounted 105-mm (4.13-in) L7 series gun, an anti-aircraft vehicle with twin 30-mm cannon, a tank destroyer armed with missiles such as TOW or HOT, an anti-aircraft vehicle with missiles, a reconnaissance vehicle with 76-mm (3-in) or 90-mm (3.54-in) gun, a cargo carrier and a multiple rocket-launcher.

Specification

MCV-80

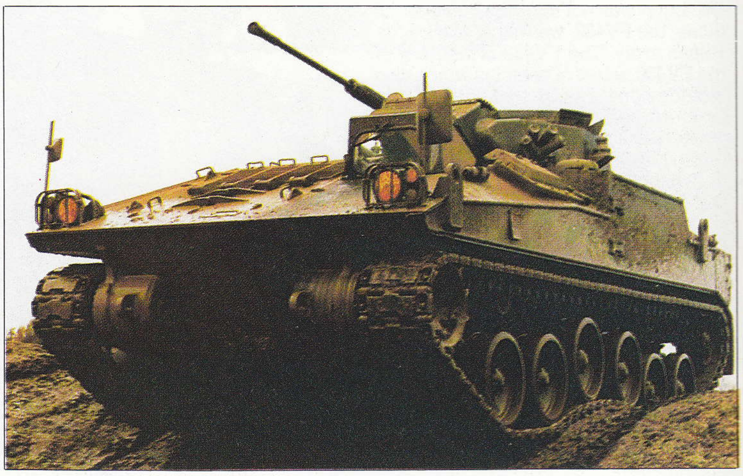
Crew: 2+8

Weight: 24000 kg (52,891 lb)

Powerplant: one Rolls-Royce CV-8 diesel developing 550 hp (410 kW)

Dimensions: length 6.34 m (20 ft 10 in); width 3.034 m (9 ft 11 in); height (overall) 2.735 m (9 ft 0 in)

Performance: maximum road speed 75 km/h (47 mph); maximum range 500 km (310 miles); fording 1.32 m (4 ft 3 in); gradient 60 per cent; vertical obstacle 0.75 m (2 ft 6 in); trench 2.49 m (8 ft 2 in)



Unlike the American M2 Bradley and West German Marder, the British MCV-80 does not have any firing ports in the rear troop compartment as there was no British army requirement for this feature. It is fitted with an NBC system and a full range of night vision equipment.

ITALY

VCC infantry armoured fighting vehicle

OTO Melara of La Spezia, well known as a manufacturer of naval weapons, have been engaged in the design and production of armoured vehicles since the 1960s and have built several thousand M113 armoured personnel carriers for the Italian army under licence from FMC of the United States. While the M113 is an excellent vehicle, it suffers from the major drawback of having an unprotected 12.7-mm (0.5-in) machine-gun mounting and no provision for the infantry to fire their weapons from within the vehicle with any degree of safety. The Automotive Technical Service of the Italian army subsequently modified the M113, and after trials this was adopted by the Italian army under the designation of the **VCC-1**, or more commonly the **Camillino** and well over one thousand of these have now been delivered to the Italian army, with final deliveries taking place in 1983. From 1983 there were delivered to Saudi Arabia 200 vehicles fitted with the Emerson Improved TOW launcher as fitted to the M901 Improved TOW Vehicle (ITV).

The forward part of the VCC-1, which was deployed to the Lebanon in 1983, is identical to the M113, with the driver at the front left and the engine to his right. The rest of the vehicle is new, the commander being seated to the rear of the driver and provided with a cupola and periscopes. The 12.7-mm (0.5-in) machine-gun is to the right of the driver in a cupola that can be traversed through 360°, lateral and rear armour protection being provided. The troop compartment is at the rear and in each side of the hull top, which is chamfered inwards on its upper part, are two firing ports each surmounted by a vision block. There is a

An Italian OTO Melara Infantry Armoured Fighting Vehicle with a roof-mounted 20-mm cannon. This is a further development of the M113, which has been built under licence by the company.

further firing port in the power-operated ramp in the hull rear. In the centre of the hull at the rear is a machine-gunner, who has an externally mounted 7.62-mm (0.3-in) machine-gun. To make more room in the troop compartment the fuel tank has been removed and the diesel fuel is now carried in two panniers externally at the hull rear, one on each side of the ramp. When the infantry fire their weapons from within the troop compartment there is a considerable build-up of fumes, which can be dangerous, so two roof-mounted fans are fitted to remove these fumes.

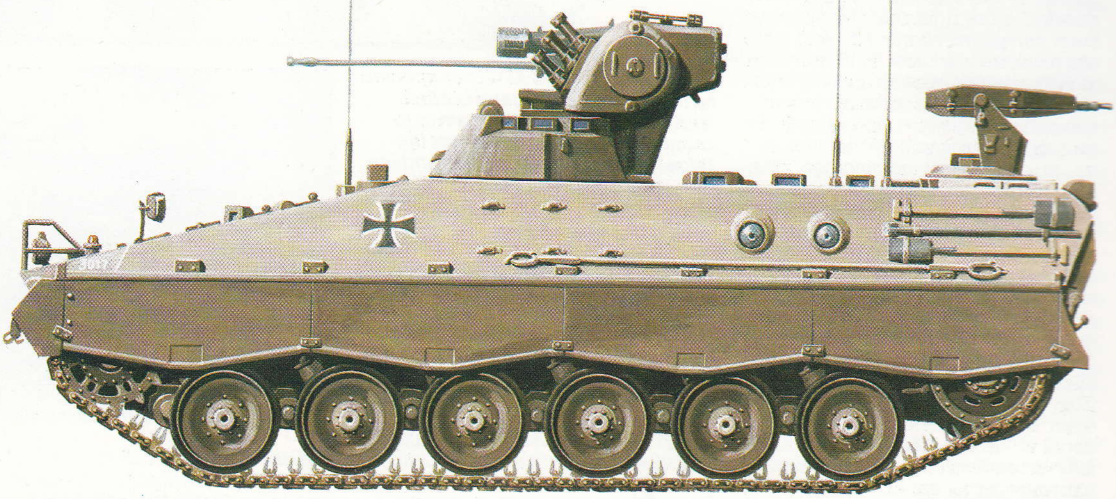
The VCC-1 is fully amphibious, being propelled in the water by its tracks at a speed of 5 km/h (3.1 mph). Before the water is entered a trim vane is erected at the front of the hull and the two electric bilge pumps are switched on. These pump out any water that seeps into the vehicle through door seals or through the hatches.

Under contract to the Italian army OTO Melara is now designing the **VCC-80** IFV, which will weigh about 20 tonnes and be fitted with a two-man power-operated turret armed with a 20-mm cannon and a 7.62-mm (0.3-in) co-axial machine-gun. For the export market OTO Melara has recently developed the **C 13** APC, which has a very low profile and can be fitted with a variety of weapons including a 25-mm cannon and a 90-mm (3.54-in) Cockerill Mk 3 gun.

Specification
VCC
Crew: 2+7
Weight: 11600 kg (25,573 lb)
Powerplant: one GMC Model 6V-53 6-cylinder water-cooled diesel developing 215 bhp (160 kW)
Dimensions: length 5.041 m (16 ft 9 in); width 2.686 m (8 ft 10 in); height (12.7 mm MG) 2.552 m (8 ft 4 in) and (hull top) 1.828 m (6 ft 0 in)
Performance: maximum road speed 64.4 km/h (40 mph); maximum range 550 km (342 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.61 m (2 ft 0 in); trench 1.68 m (5 ft 6 in)

WEST GERMANY

Marder mechanized infantry combat vehicle



Above: Recently many Marders have been fitted with new passive night vision equipment and a Euromissile MILAN ATGW system. In the future the 20-mm cannon will be replaced by a 25-mm weapon to enable the vehicle to defeat the latest Soviet light combat vehicles, such as the BMP-2.

When the West German army was reformed in the 1950s its first mechanized infantry combat vehicle was the SPz 12-3 based on a Swiss chassis and subsequently manufactured both in England and West Germany. A decision was taken at an early stage that a complete family of vehicles would be developed that would use the same basic chassis. The first members of this family to enter service were the **Jagdpanzer Kanone** with a 90-mm (3.54-in) gun and the **Jagdpanzer Rakete** armed with SS.12 ARGWs (recently replaced by HOT). After many different prototypes had been built and subjected to extensive tests one of these was finally adopted by the West German army as the **Marder Schützenpanzer Neu M-1966**, and Rheinstahl (now Thyssen Henschel) was selected as prime contractor with MaK of Kiel as the second source. First production vehicles were delivered late in 1970 and production continued until 1975, by which time 3,000 vehicles had been built. The Marder was not exported overseas although recently Saudi Arabia has shown some interest in the vehicle.

At the time of its introduction the Marder was the most advanced MICV in the West, and even today it is matched only by the more recent Bradley infantry fighting vehicle. The Marder has excellent armour protection and a high cross-country speed to enable it to operate with the Leopard 1 and Leopard 2 MBTs as part of the combined-arms team.

The driver is seated at the front left with one infantryman to his rear and the engine to his right. The two-man power-operated turret (commander and gunner) is in the centre of the vehicle with the troop compartment at the rear. The infantry enter and leave via a power-operated ramp in the hull rear, and on each side of the troop compartment are two spherical firing ports, each with a roof-mounted periscope above it to enable infantrymen to aim and fire their rifles from within the vehicle.

The turret is armed with a dual-feed 20-mm Rh 202 cannon and a co-axial 7.62-mm (0.3-in) machine-gun. These can be elevated from −17° to +65°, turret traverse being 360°. In the future the 20-mm cannon will be replaced by a Mauser 25-mm weapon firing ammunition with better armour-piercing characteristics to enable it to combat recent Soviet vehicles such as the BMP. Some Marders have recently been fitted with a Euromissile MILAN ATGW launcher on the turret to enable them to engage MBTs out to a maximum range of 2000 m (2,190 yards). Mounted above the rear troop compartment is a remote-controlled 7.62-mm (0.3-in) machine-gun.

Variants of the Marder in service with the West German army include the Roland SAM system with two missiles in the ready-to-launch position and a further eight in reserve, and another model with a surveillance radar on a hydraulically-operated arm that can be raised above the top of the vehicle for increased radar coverage.

The chassis of the Marder is also used as the basis for the Argentine **TAM** medium tank and its variants, including the **VCTP** infantry combat vehicle and the **VCTM** 120-mm (4.72-in) mortar carrier; none of these vehicles were used during the Falklands campaign of 1982.

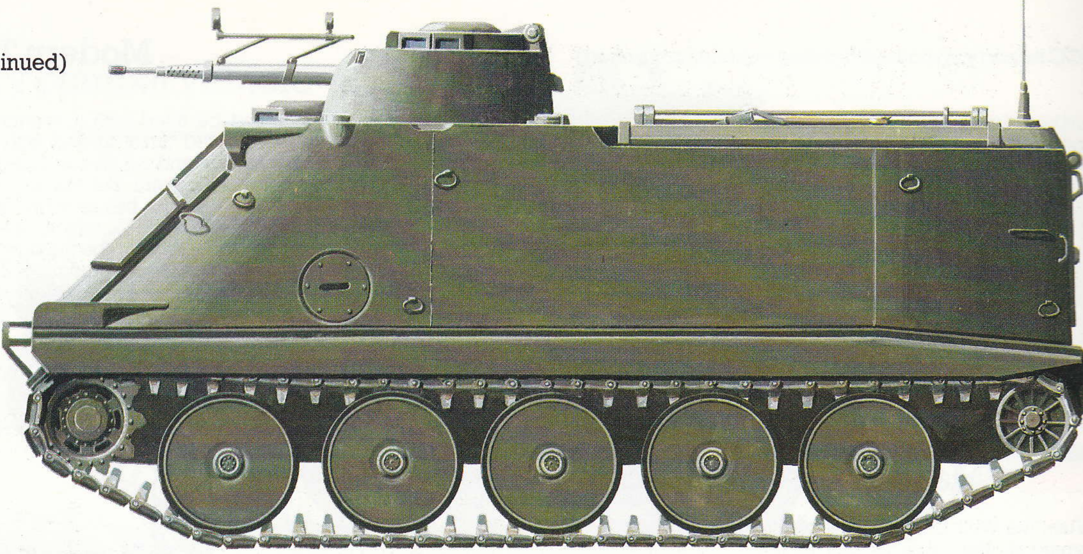
The Marder was the first MICV to enter service in the West, and is fitted with a two-man power-operated turret armed with a 20-mm cannon and a 7.62-mm (0.3-in) machine-gun. It has not so far been exported.

Specification
Marder
Crew: 4+6
Weight: 28200 kg (62,169 lb)
Powerplant: one MTU MB 833 6-cylinder diesel developing 600 hp (447 kW)
Dimensions: length 6.79 m (22 ft 3 in); width 3.24 m (10 ft 8 in); height (overall) 2.95 m (9 ft 8 in)
Performance: maximum road speed 75 km/h (46.6 mph); maximum range 520 km (323 miles); fording 1.50 m (4 ft 11 in); gradient 60 per cent; vertical obstacle 1.00 m (3 ft 3 in); trench 2.50 m (8 ft 2 in)

SWEDEN

Pbv armoured personnel carrier

Although the Swedish army deployed tanks well before World War II, it was not until the post-war period that the first full-tracked armoured personnel carriers were fielded. These were called the **Pbv 301** and were essentially the older Strv m/41 light tank stripped down to the basic chassis and rebuilt as an armoured personnel carrier. This was armed with a 20-mm cannon and could carry eight fully-equipped infantrymen as well as the two-man crew. The conversion work for the Pbv 301 was carried out by Hägglund & Söner between 1962 and 1963. Even before this work had started the Swedish army realized that this would only be a interim solution as the basic chassis was so old. Design work on the new **Pbv 302** armoured personnel carrier started in 1961 and progress was so quick that the first prototypes were completed in the following year. After the usual trials the company was



Above: The Pbv 302 APC is only used by the Swedish army, and is fitted with a turret-mounted 20-mm cannon. Before entering water the bilge pumps are switched on and the trim vane erected at the front.

awarded a full-scale production contract and production was undertaken from 1966 to 1971. The Pbv 302 was not sold abroad, although it was offered to several countries. The main reason for this lies with the fact that the export of defence equipment is subject to such strict controls that Sweden can deal with only a very few countries.

In some respects the Pbv 302 is very similar in layout to the American M113, although the Swedish vehicle has some noticeable features that, when the vehicle was introduced, put it some way ahead of its competitors. The hull is of all-welded steel armour with the driver in the centre at the front, the gunner to the left rear and the commander to the right rear. Main armament comprises 20-mm Hispano cannon mounted in a turret with a traverse of 360°, weapon elevation being from −10° to +60°. The cannon can fire either high explosive (in belts of 135 rounds) or armour-piercing (in 10-round magazines) ammunition. The same turret has also been fitted to a number of other vehicles including M113s of the Swiss army and EE-11 (6×6) vehicles of Gabon. The troop compartment is at the rear of the hull, with the 10 infantrymen seated five along each side facing inwards. No firing ports are provided, although hatches over the troop compartment allow the troops to fire their weapons from within the vehicle. The infantry enter and leave the vehicle via two doors in the hull rear. The Pbv 302 is fully amphibious, being propelled in the water by its tracks.

The basic vehicle can also be used as an ambulance or a cargo carrier, while more specialized versions include an artillery command vehicle, an armoured observation post vehicle and a fire direction-post vehicle. The prototype of the **Pbv 302 Mk 2** armoured personnel carrier has been built by Hägglund & Söner as a private venture. This has a separate cupola at the rear for the squad commander, a Lyran flare system and other minor modifications. The company has also proposed that the vehicle be converted into a mechanized infantry fighting vehicle with 25-mm cannon and sloping hull sides (like those of the Italian IFV) provided with firing ports and vision blocks.

Swedish infantrymen dismount from the rear of their Pbv 302 armoured personnel carrier. The Pbv 302 was one of the first vehicles of its type to enter production with a fully enclosed weapon station.

Specification

Pbv 302

Crew: 2+10

Weight: 13500 kg (29,762 lb)

Powerplant: one Volvo-Penta Model THD 100B 6-cylinder inline diesel developing 280 hp (209 kW)

Dimensions: length 5.35 m (17 ft 7 in); width 2.86 m (9 ft 5 in); height (turret top) 2.50 m (8 ft 2 in) and (hull top) 1.90 m (6 ft 3 in)

Performance: maximum road speed maximum road speed 66 km/h (41 mph); maximum road range 300 km (186 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.61 m (2 ft 0 in); trench 1.80 m (5 ft 11 in)

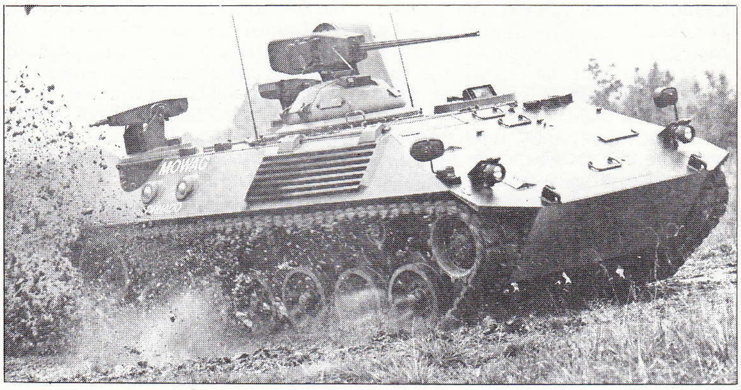
SWITZERLAND

MOWAG Tornado mechanized infantry combat vehicle

The MOWAG company has been engaged in the design and development of tracked and wheeled vehicles since just after World War II, and in the early 1960s it was awarded a contract from the West German government for the construction of prototype of a mechanized infantry combat vehicle that eventually became known as the Marder. In the 1970s the company developed as a private venture the very similar **Tornado** MICV, whose latest version, called the **Improved Tornado**, was announced in 1980. At this time the Swiss army's standard APC is the American M113, though many of these have been fitted with a Swedish turret armed with a 20-mm cannon. With the recent decision to order 420 Leopard 2 MBTs there is an obvious requirement for a MICV to work with this vehicle as part of the combined-arms team.

The hull of the Improved Tornado is of all-welded steel construction and probably has better protection against armour-piercing projectiles than most vehicles on the market today as its sides and front are so well sloped for the maximum possible protection. The driver is at the front of the vehicle on the left, with the commander to his rear and the engine and transmission to his right. In the centre of the hull can be mounted a wide range of armament installations depending on the mission requirement. One of the most powerful installations is the Swiss Oerlikon-Bührle two-man power-operated Type GDD-AOE turret, which has an externally mounted 35-mm KDE cannon fed from two ready-use magazines each holding 50 rounds. One could hold armour-piercing rounds to engage other vehicles while the other could hold high explosive rounds for use against softer target such as trucks. Mounted co-axially with the 35-mm cannon is a 7.62-mm (0.3-in) machine-gun with 500 rounds of ready-use ammunition for the engagement of soft targets. The infantrymen are seated in the troop compartment at the hull rear, and enter and leave via a power-operated ramp. On each side of the troop compartment are spherical firing ports that allow some of the troops to fire their weapons from within the vehicle. If required, two remote-controlled 7.62-mm (0.3-in) machine-guns can be fitted (one on each side) at the rear on the troop compartment roof. These are almost identical to those fitted to the Marder, also built by MOWAG. Each mount can be traversed through 230° and the machine-guns can be elevated from −15° to +60°.

As with most vehicles of its type, the Improved Tornado is fitted with an NBC system and night-vision equipment. The design of the chassis is such that it can be adopted for a wide range of other roles such as command vehicle, missile carrier, recovery vehicle, mortar carrier and so on, but as far as it is known none of these have reached even the prototype stage.



The Tornado MICV has been developed by MOWAG of Switzerland as a private venture. This particular Tornado has a turret-mounted 25-mm cannon and two machine-guns at the rear.

Specification

MOWAG Tornado

Crew: 3+7

Weight: 22300 kg (49,162 lb)

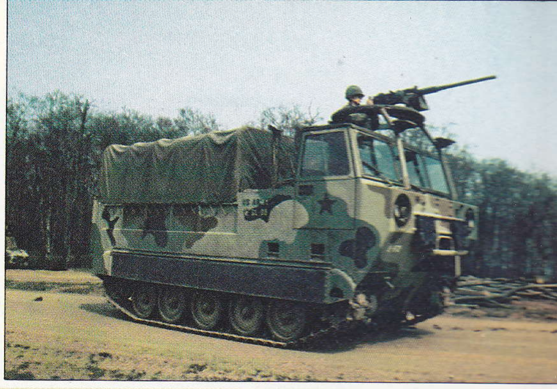
Powerplant: one Detroit Diesel Model 8V-71T diesel developing 390 hp (290 kW)

Dimensions: length 6.70 m (22 ft 0 in); width 3.15 m (10 ft 4 in); height (hull top) 1.75 m (5 ft 9 in) and (turret top) 2.86 m (9 ft 5 in)

Performance: maximum road speed 66 km/h (41 mph); maximum road range 400 km (249 miles); fording 1.30 m (4 ft 3 in); gradient 60 per cent; vertical obstacle 0.85 m (2 ft 9 in); trench 2.20 m (7 ft 3 in)

M113 in Action

In the mid-1950s a US Army requirement existed for a lightweight armoured infantry vehicle that was amphibious, of high cross-country mobility and capable of air drop operation. The resulting prototype was to develop into one of the most successful military vehicles in history. With more than 75,000 produced since 1960, the M113 armoured personnel carrier has appeared in a bewildering range of roles and variants and has been sold to some 50 countries.



Using many M113 components, the unarmoured M548 is itself the basis for a number of variants. It is normally used to carry cargo in the forward battlefield area, for example ammunition for M109 and M110 self-propelled artillery weapons.

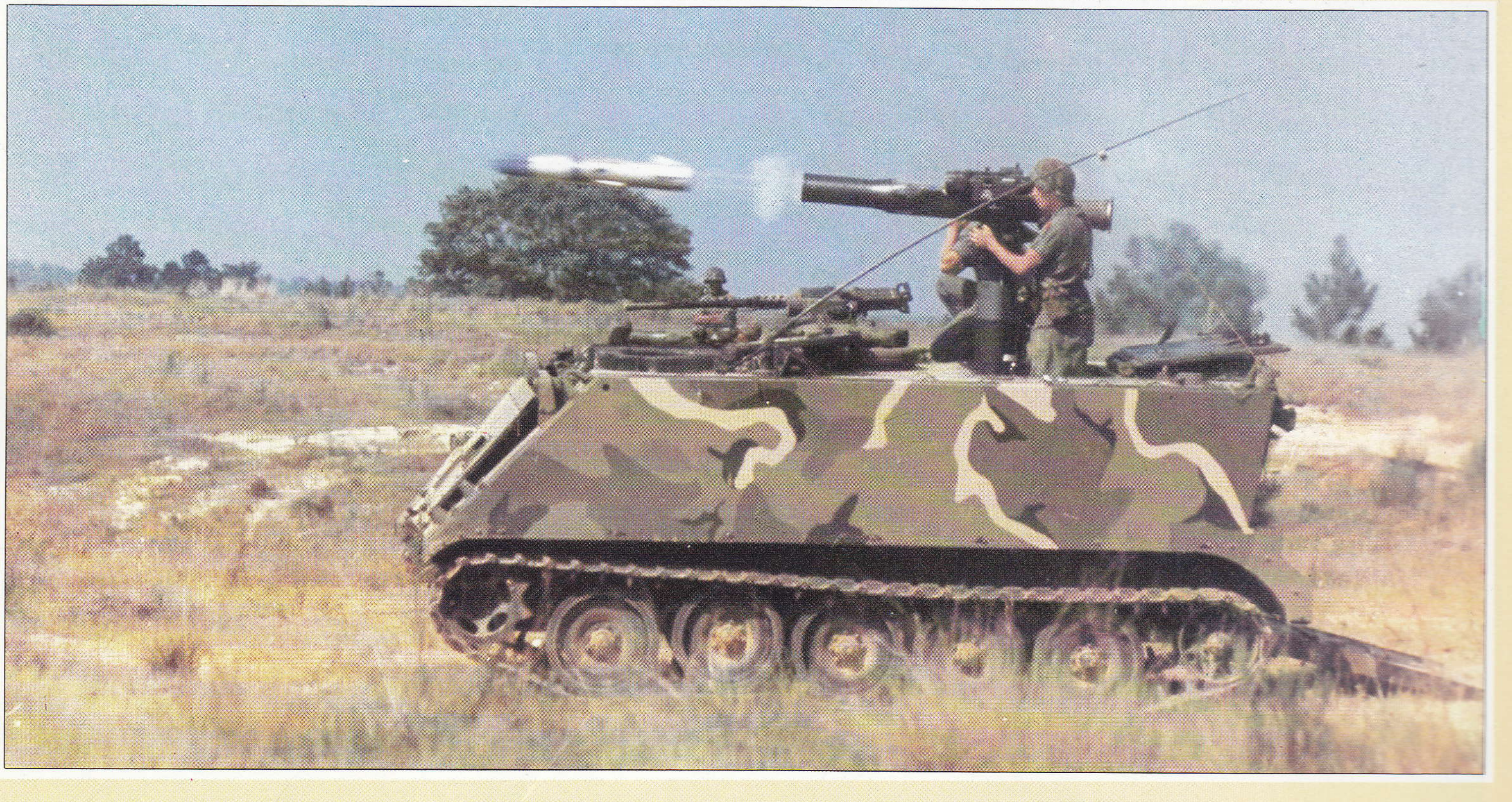
In the mid-1950s the Ordnance Division of the FMC Corporation of San Jose, California, was building a full-tracked armoured personnel carrier for the US Army under the designation of the M59. This vehicle was a major improvement over the earlier M75, but still suffered from a number of adverse features, the most serious of these being its low power-to-weight ratio which limited cross-country performance. In appearance the M59 was similar to the later M113, and its most unusual feature was that it was powered by two General Motors petrol engines, with one engine in each side wall of the troop compartment. This feature not only made the troop compartment noisy but also made the vehicle wider. The M59 had a two-man crew and weighed almost 20 tonnes.

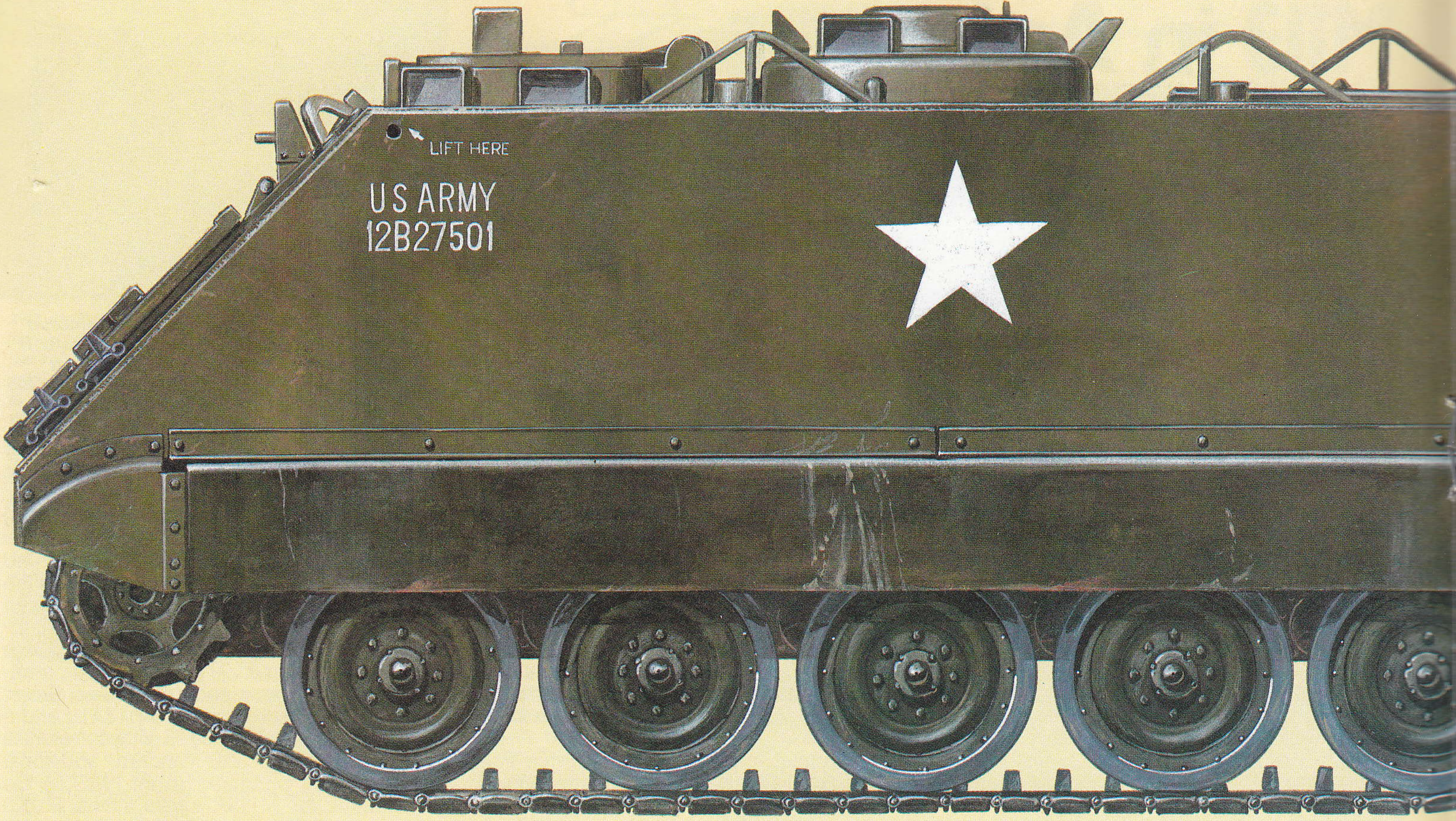
By the mid-1950s the US Army was paying increased attention to lighter vehicles that could easily be transported by transport aircraft to any part of the world. A decision was taken to build prototypes of a new armoured personnel carrier whose mechanical components would also be used to form a complete family of vehicles. Prototypes of steel (designated T117) and aluminium (designated T113) vehicles were built and tested. The latter was standardized for service in 1960 as the M113 armoured personnel carrier, and was soon in production at San Jose. Since then the vehicle has been constantly improved to meet changing requirements, and in 1984 is still in production for the US Army and for export. Over 75,000 vehicles have now been built and sales made to some 50 countries including Argentina, Australia, Belgium, Bolivia, Brazil, Canada, Chile, Costa Rica, Denmark, Ecuador, Egypt, El Salvador, Ethiopia, Guatemala, Greece, Haiti, Iran, Israel, Italy, Jordan, Kampuchea, Kuwait, Laos, Lebanon, Libya, Morocco, The Netherlands, New Zealand, North Yemen, Norway, Pakistan, Peru, Philippines, Portugal, Saudi Arabia, Singapore, Somalia, South Korea, Spain, Sudan, Switzerland, Taiwan, Thailand, Tunisia, Turkey, Uruguay, Vietnam, West Germany and Zaire. The Italian company OTO Melara of La Spezia has also built some 4,000 M113s for the Italian army and one or two other NATO countries, and further development has resulted in the much improved Infantry Armoured Fighting Vehicle (IAFV) which is also used by the Italian army and by Saudi Arabia in the anti-tank role fitted with the American Emerson twin TOW launcher as installed on the M901 Improved TOW Vehicle (ITV). More recently Belgium has started to make the M113A2 version under licence for its army.

The original model to enter service was powered by a Chrysler 75M V-8 petrol engine that developed 209 bhp (156 kW), giving the vehicle a maximum road speed of 64 km/h (40 mph) and a cruising range of 322 km (200 miles). At about the same time a decision was made to power all future armoured vehicles with diesel rather than petrol engines, both to increase their operating range (diesels being more fuel-efficient than petrol engines) and to reduce the risk of fire. Trials with a diesel-powered model designated T113E2 were successful and from 1964 the petrol-powered M113 was replaced on the production lines by the diesel-powered M113A1. This was powered by the proven General Motors Corporation Detroit Diesel Model 6V-53 six-cylinder diesel which develops 215 bhp (160 kW) to give a cruising range of 483 km (300 miles).

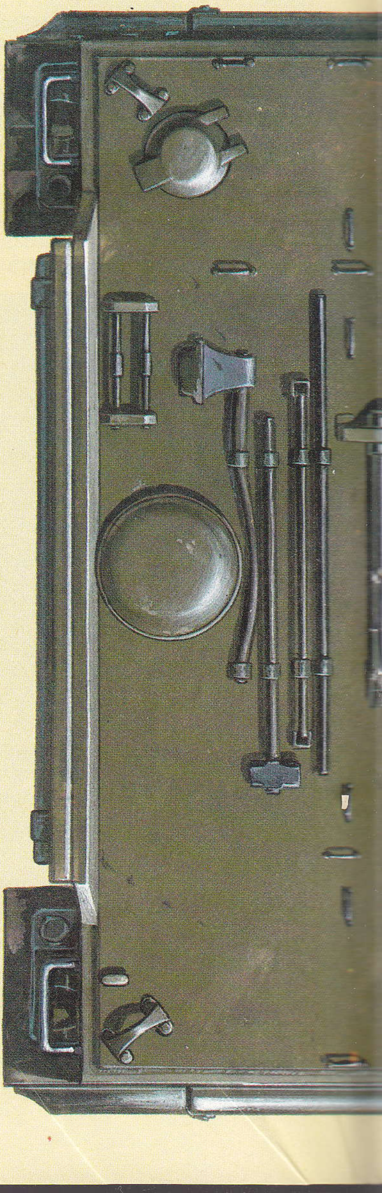
The next model to enter production (in 1979) was the M113A2, which is essentially the M113A1 with an improved cooling system and improved suspension. This model retains the same engine as the M113A1 but the increased weight has slightly lowered its power-to-weight ratio. At this time the United States Army still had over 5,000 of the original petrol-powered M113s in service as well as almost 13,000 of the diesel-powered M113A1s, and a decision was taken to bring all of these vehicles up to the new M113A2 standard, additional vehicles being purchased from FMC as the requirement for M113A2s was almost 20,000 vehicles, including variants. These conversions are now being carried out both in the United States as well as overseas in West Germany and South Korea. In the overseas locations it is cheaper to carry out the work locally than return the vehicles to the United States.

An M113 of the American army with a basic infantry TOW ATGW being launched. This photograph clearly shows how vulnerable the gunner is to enemy small arms fire and shell splinters, and for this reason the Improved TOW Vehicle (M901) has now been introduced on a large scale.





Standard APC of the US Army for 20 years, the M113 has recently been the subject of a product improvement programme. The M113A2 will have considerably improved engine and suspension performance, and the 5,300 M113s and 12,700 M113A1s to be converted will be joined by 2,660 new-built M113A2s to give a total of more than 20,000 in service by 1989. While the M2 Bradley is to replace the M113 in many roles, they will not be exchanged on a one-to-one basis, and the M113 will continue to serve for years to come.



Specification

M113A2

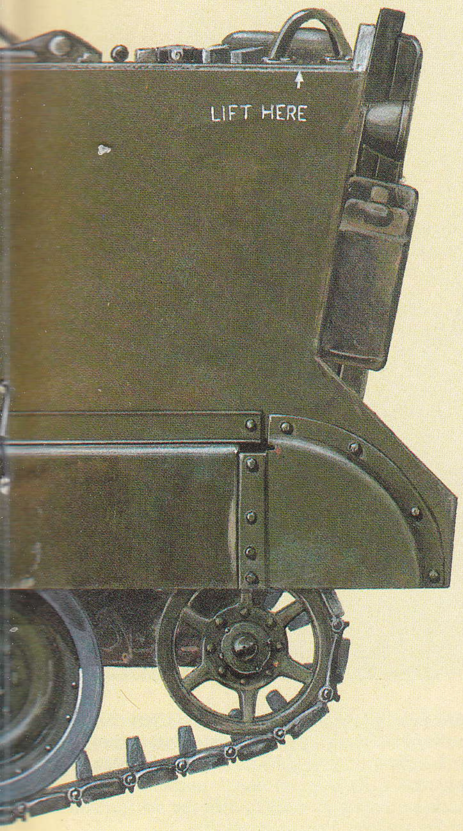
Crew: 2 + 11

Weight: 11341 kg (25,002 lb)

Powerplant: one GMC Detroit Diesel Model 6V53 six-cylinder water-cooled diesel developing 215 bhp (160 kg)

Dimensions: length 2.686 m (8 ft 9 in); width 2.54 m (8 ft 4 in); height (hull top) 1.85 m (6 ft 1 in); overall (if Browning M2HB carried) 2.52 m (8 ft 3 in)

Performance: maximum road speed 67.59 km/h (42 mph); maximum water speed 5.8 km/h (3.6 mph); maximum range 483 km (300 miles); fording, amphibious; gradient 60 per cent; vertical obstacle 0.61 m (2 ft); trench 1.68 m (5 ft 6 in)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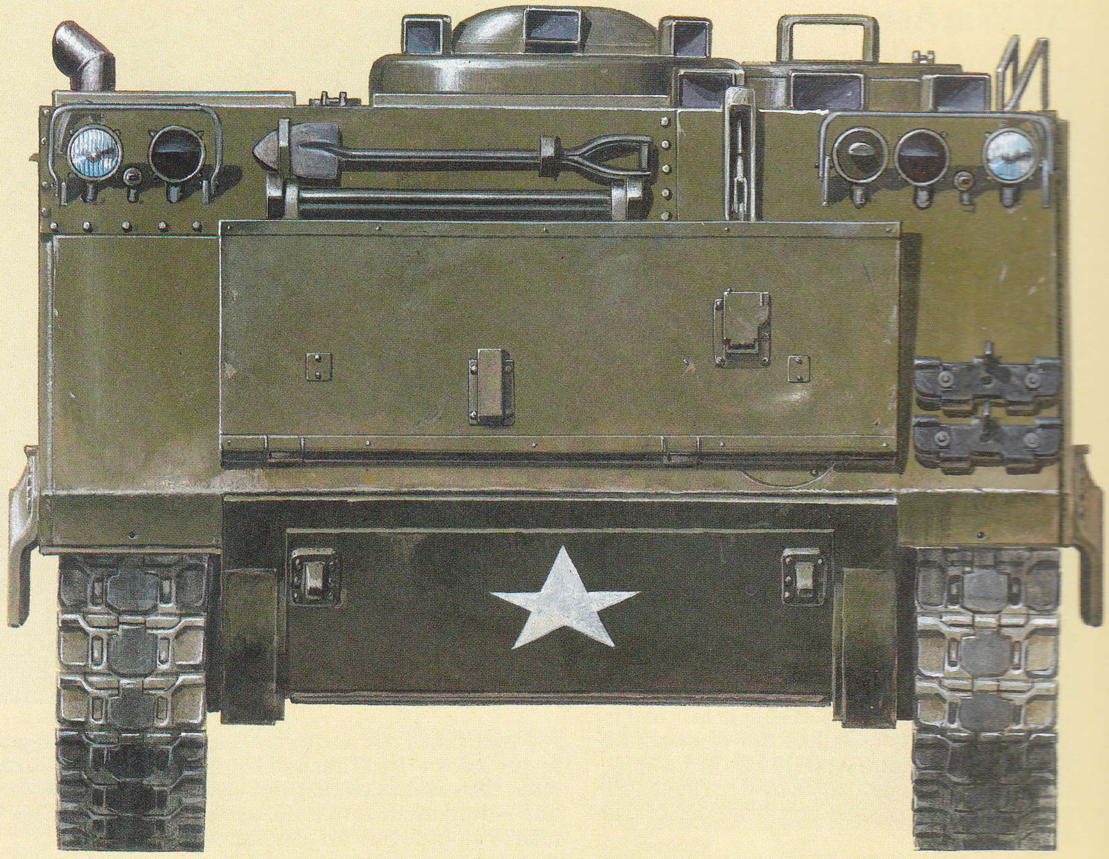
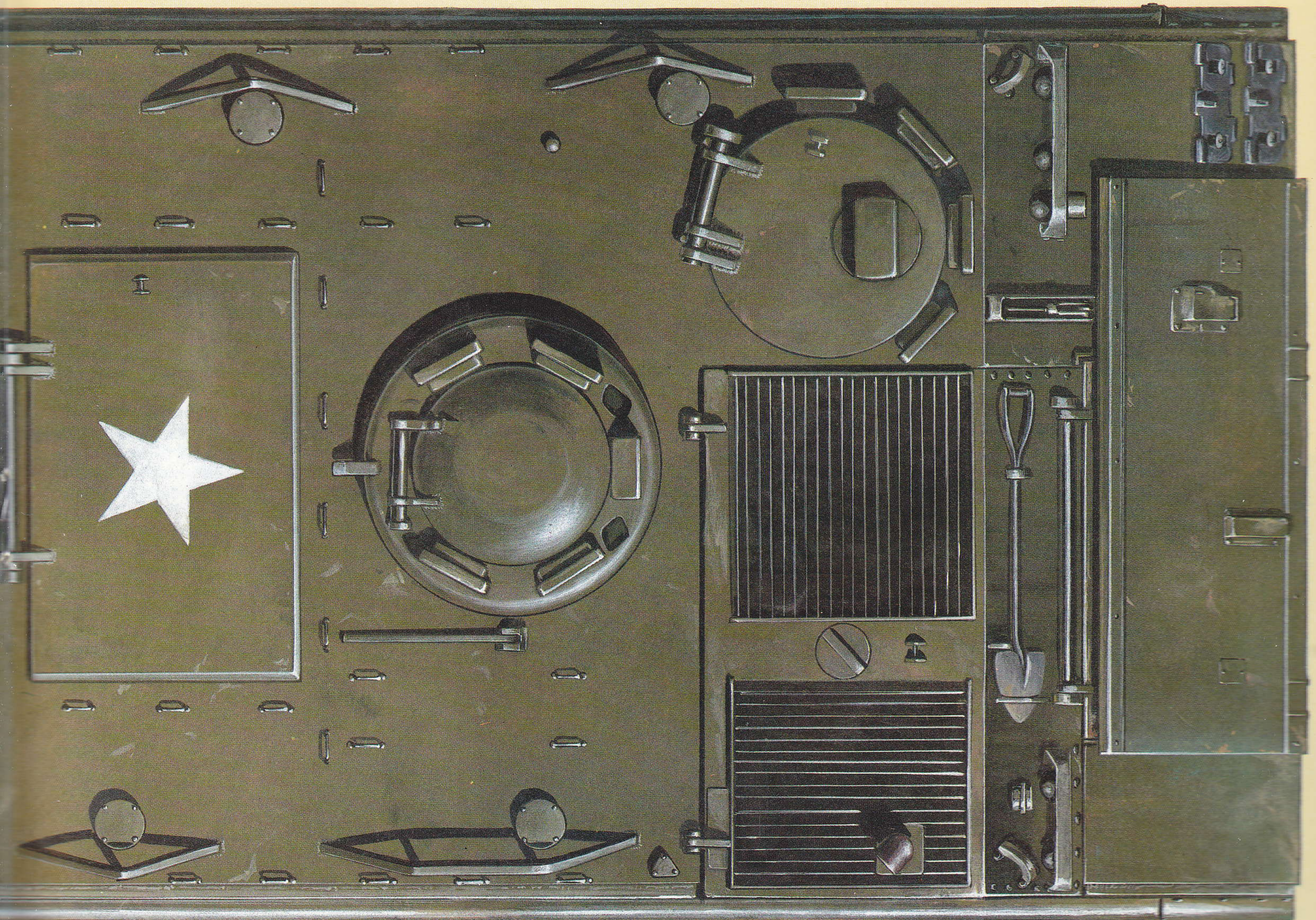




M113 in Action

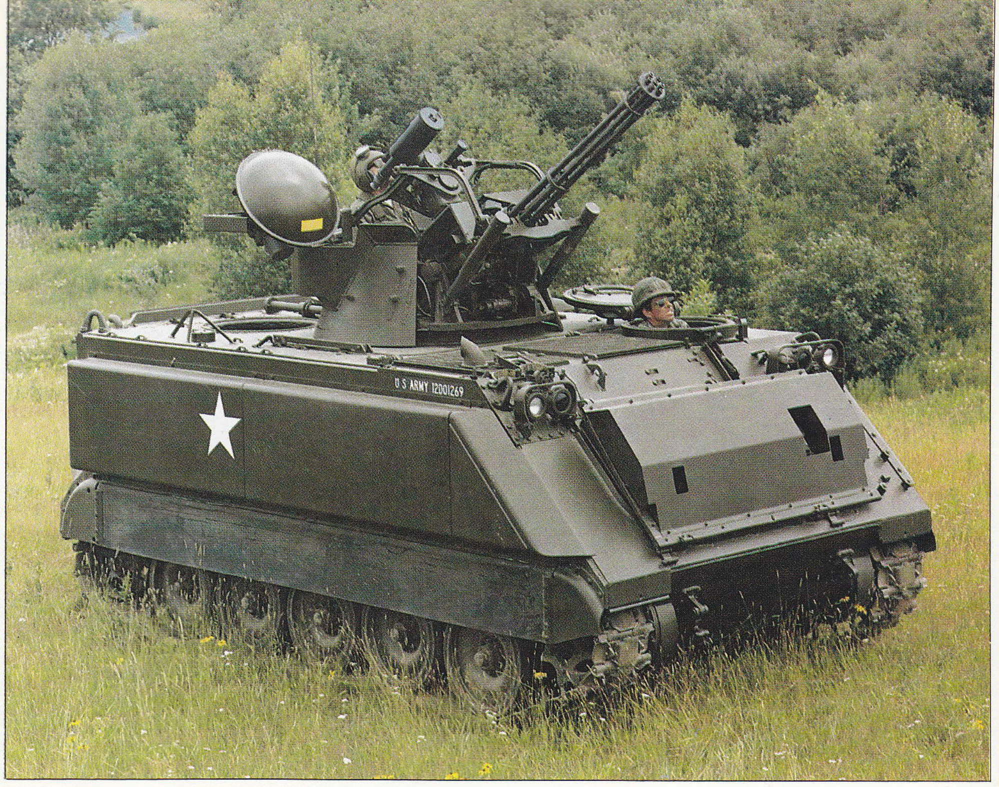
It is expected that the next version to enter production will be the M113A3, which is the M113A2 fitted with the more powerful 6V-53T turbocharged diesel engine developing 275 hp (205 kW), new transmission and new driver's controls. These improvements have led to enhanced acceleration, superior cross-country performance, better fuel consumption and generally upgraded reliability.

Description

All members of the M113 APC have the same basic layout within a hull of all-welded aluminium construction, with the driver at the front left, powerpack to his right, commander in the centre of the vehicle and the troop compartment at the rear. The commander has a cupola which can be traversed manually through 360° and is provided with five periscopes and a single-piece hatch cover. Mounted externally on the commander's cupola is a standard 12.7-mm (0.5-in) M2 HB machine-gun with a box of 100 rounds of ammunition for ready use, a further 1,900 rounds being carried inside the vehicle. The major drawback of this arrangement is that the commander has no protection at all from small arms fire and shell splinters and for this reason many countries (for example Australia, Switzerland and Norway) have replaced this arrangement in many of their vehicles by a turret-mounted machine gun or cannon.

The 10 fully-equipped troops sit five down each side of the troop compartment facing each other, and enter and leave via a power-operated ramp in the hull rear; the rear is also provided with a door in case the ramp fails to open. Over the top of the troop compartment is a single hatch cover that opens to the rear.

The suspension is of the proven torsion-bar type, each side having five rubber-tyred road wheels, with the drive sprocket at the front and idler at the rear; there are no track-return rollers. The M113 is fully amphibious, being propelled in the water by its tracks at a speed of 5.8 km/h (3.6 mph), the only preparations required being the manual erection of the trim vane at the front of the hull and the starting of the electric bilge pumps to dispose of any water that seeps in through the ramp seals or splashes in through any opening in the hull top. The vehicle is capable of swimming lakes and rivers that do not have a fast current, and crossing points must be chosen with care as the M113 cannot exit up steep river banks without assistance.



The air defence version of the M113 is called the M163, and is fitted with a power-operated turret armed with a six-barrelled 20-mm cannon and a range-only radar. As it is heavier than the basic vehicle, side and front pods provide the additional buoyancy for amphibious operations.

As with most vehicles today, the manufacturer provides a wide range of optional equipment such as various NBC defence and detection equipment, applique armour, passive night vision device for the driver, additional buoyancy aids, heater for both troop compartment and engine areas, stretcher kit, dozer blade that can be mounted on the front of the hull, shields for the machine-gun and so on.

A large family

There are probably more variants of the M113 family than any other vehicle in existence in the world today, and these can be divided into two series. First are those that use the hull of the M113 itself, modified in many applications, and second are those that use the chasis of the unarmoured M548 tracked load carrier that is also a member of the M113 family. In addition many countries have carried out extensive modifications to meet their own particular requirements, notable being West Germany and Israel, who are the largest operators of the M113 apart from the United States.

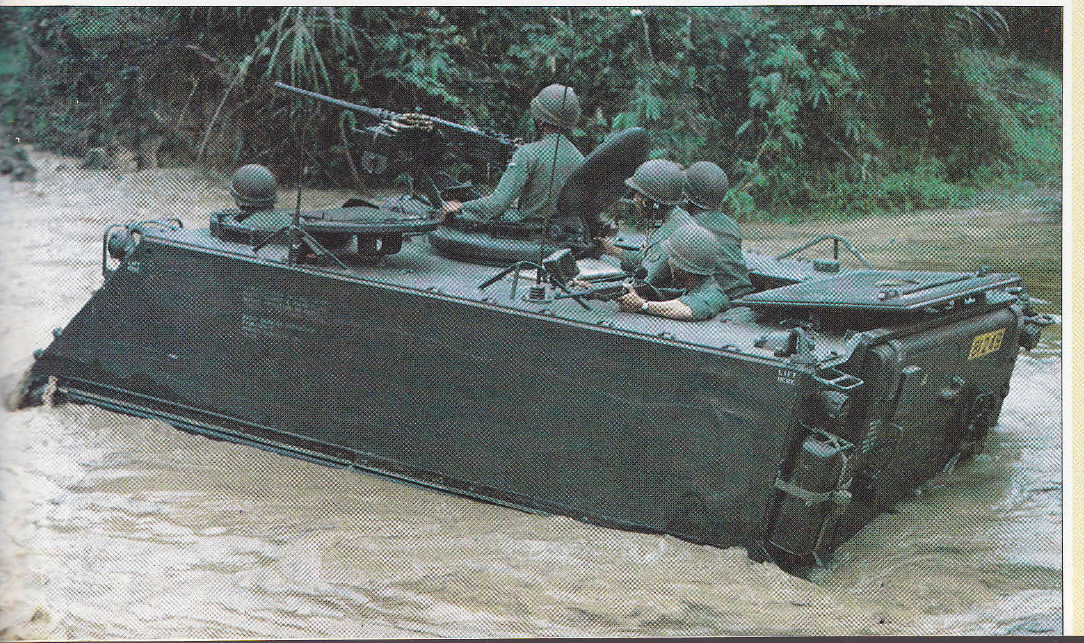
M113 variants

There are two mortar-carriers, the M106/M106A1 and the M125/M125A1, the A1 models being powered by the diesel engine. The first of these has a 107-mm (4.2-in) mortar mounted in the rear with a traverse of 43° left and 46° right, and 93 or 88 mortar bombs are carried. The M125 has the 81-mm (3.19-in) mortar mounted on a turntable that can be traversed through 360°, so enabling it to be quickly laid onto a new target without the need for the vehicle to be moved. In both cases the mortar can be dismounted and fired away from the vehicle if required.

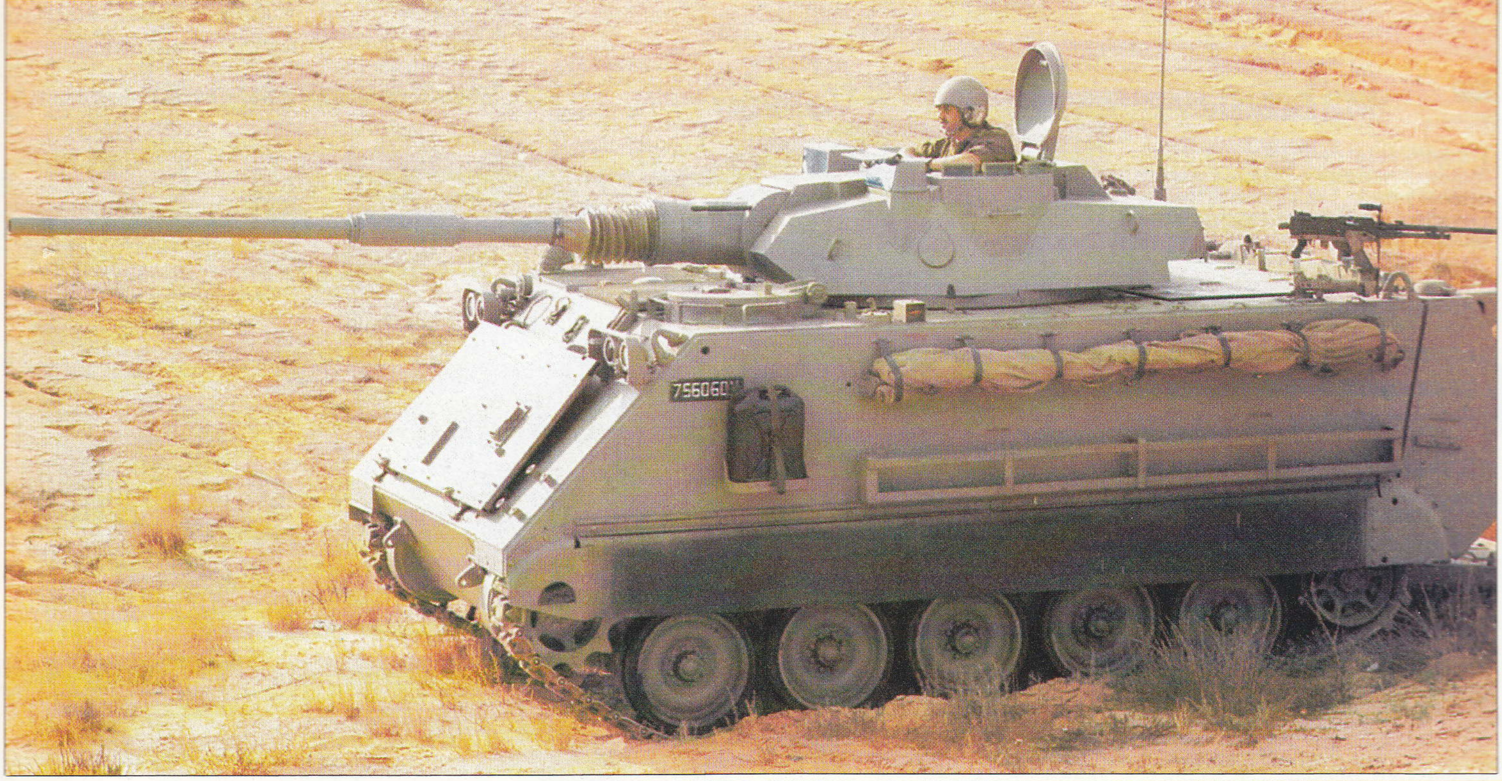
The anti-aircraft member of the family is the M163, which is fitted with a power-operated turret armed with a six-barrelled 20-mm Vulcan cannon. This is the current mainstay of American mobile anti-aircraft units, but will be replaced by the twin 40-mm DIVAD system in the near future. A flamethrower version was developed and deployed to Vietnam, but this is no longer in regular use, although numbers are held in reserve.

The command version is the M577, which entered production in 1962. This is easily distinguishable from the basic M113 as it has a much higher roof to allow the command staff to work in an upright position. It has extensive communications equipment and a tent can be erected at the rear to increase the work area available.

One of the more recent versions to enter service with the US Army is the M901 Improved TOW Vehicle (or ITV as it is more commonly called). This is the basic vehicle fitted on the full roof with an Emerson power-operated launcher that can be elevated from behind cover and carries two Hughes TOW ATGWs in the ready-to-launch position; an additional 10 mis-



An M113 fording a river somewhere in South Vietnam. As a result of early combat experience, the 12.7-mm (0.5-in) machine-gunner was provided with all-round protection, and a 7.62-mm (0.3-in) machine-gun and shield were mounted either side of the rear troop compartment hatch to provide more fire support.



An Israeli M113 series APC fitted with an experimental two-man turret armed with an Israel Military Industries 60-mm hyper-velocity medium support weapon. This can fire HE and APFSDS-T rounds, with the first three rounds being fired in 1.5 seconds.

siles are carried inside for rapid reloading. A standard ground TOW launcher is also carried so missiles can be launched away from the vehicle if required. In addition to being used by the US Army, which has ordered over 2,000 vehicles, the ITV is also used by Egypt, Greece, Jordan, Kuwait, Pakistan, the Netherlands (on AIFV chassis) and Saudi Arabia (on VCC-1 chassis). The Fire Support Team Vehicle (FISTV) is similar in appearance to the Improved TOW Vehicle except that it does not carry missiles in the launcher; these have been replaced by surveillance equipment and a laser. This vehicle is used to locate targets for the artillery and to direct Cannon-Launched Guided Projectiles (CLGPs) onto enemy tanks.

Further development of the M113 by FMC Corporation has resulted in the Armoured Infantry Fighting Vehicle which has already been selected by at least three countries. Components of the M113 are also used in the Lynx command and reconnaissance vehicle used by Canada and the Netherlands. The basic chassis has also been selected for a number of private-venture weapons developments including the Martin Marietta/Oerlikon-Bührle Air Defence Anti-tank System (ADATS), which has eight missiles in the ready-to-launch position, and the Fire Support Combat Vehicle with a hull-mounted 105-mm (4.13-in) gun, although the latter did not enter production.

As mentioned above, the basic vehicle has a single roof-mounted 12.7-mm (0.5-in) machine-gun, but many companies offer different weapon systems: for trials purposes, for example, Cadillac Gage have fitted a M113 with a two-man turret armed with a 90-mm (3.54-in) Cockerill gun, and this is believed to have undergone trials in Egypt, which has a requirement for a vehicle of this type.

M548 variants

The basic M548 tracked cargo carrier was originally used to carry supplies in the forward battlefield area, especially ammunition for artillery weapons. Since then its chassis has also been adopted for a wide range of other roles. These include the M48 Chaparral surface-to-air missile system with four missiles in the ready-to-launch positions. The recent M1015 carries the Emerson TEAMPACK radar monitoring system, while the M752 transports and launches the Vought Lance surface-to-surface tactical nuclear missile used by a number of NATO countries and Israel, although the latter country does not have American tactical nuclear warheads. The similar M688 carries three replacement Lance missiles and has a hydraulic crane for reloading purposes. The British army has an armoured version of the M548 that has a launcher at the rear for eight British Aerospace Rapier surface-to-air missiles in the ready-to-launch position. The chassis is also used to carry mine-laying and mine-clearing equipment, twin 35-mm anti-aircraft guns and a variety of specialized electronic equipment and fire-control devices.

M113 in Action

The M113 has seen action in almost every part of the world including the Middle East, Central America, North Africa and the Far East. The South Vietnamese first used the M113 operationally in mid-1962, taking the Viet Cong by surprise as they were totally unprepared to engage armoured vehicles, being equipped mainly with small arms and machine-guns. By the following year the Viet Cong had started to use armour-piercing machine-gun ammunition against the M113, as well as 57-mm and 75-mm recoilless rifles. Mines were also used to destroy M113s, especially in the swampy areas where the vehicles often operated. At a later date RPG-7 rocket-propelled grenades were also used against the M113. On paper all of these weapons could penetrate the armour of the M113, but in many cases the vehicle was not completely disabled as the penetration was so small. For Vietnam the Armoured Cavalry Assault Vehicles (ACAV) was designed, this being a basic M113 with its 12.7-mm (0.5-in) machine-gun provided with all-round protection, and a 7.62-mm (0.3-in) machine-gun with a shield mounted on each side of the troop compartment roof; as no side or rear armour protection was provided for the latter gunners their casualty rates were high. Very often the troops would prefer to sit on top of the vehicle rather than be seated inside, as in the troop compartment they had no idea what was going on outside. Also, if the vehicle was hit by a mine or rocket, they preferred to take their chances outside the vehicle. To provide some protection against mines, which were often made from unexploded bombs dropped by American aircraft, the floor of the vehicle was covered with sandbags. The M113s originally deployed to Vietnam were of the petrol-engined type whose fuel tank was mounted inside the troop compartment. When stationary for any length of time M113 crews would often erect a wire mesh screen around the vehicle to detonate any rockets before they could hit the vehicle.

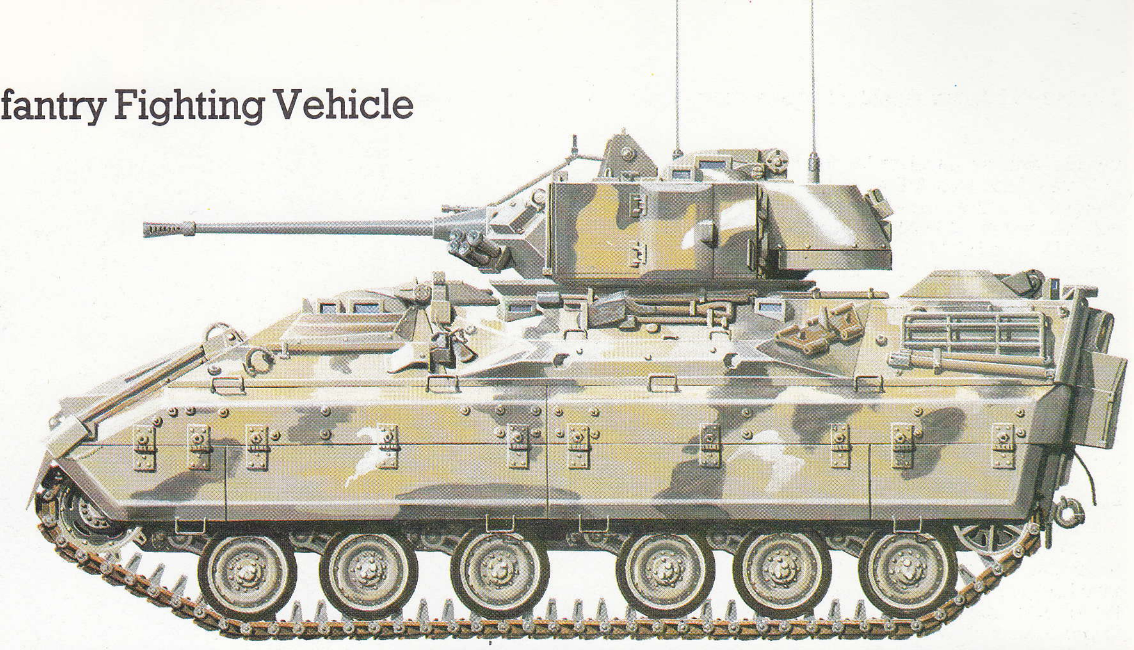
Today the Israeli army has some 3,000 M113 series vehicles, commonly known as the Zelda. Most of these have been fitted with additional 7.62-mm (0.3-in) machine-guns around the tops of their hulls to give the maximum amount of suppressive-fire capability against anti-tank weapons when the vehicles are operating with Israeli tanks. They also have racks mounted externally on the sides of the hull to stow personal equipment that would otherwise clutter the inside of the vehicle. As amphibious capability is not required in the desert, many vehicles have had the trim vane removed from the front of the hull and an extension fitted to the exhaust pipe so that fumes do not blow back into the crew area. For use in Lebanon, a special version of the M113 is used, this having spaced armour to protect the vehicle against the RPG-7 rockets used by the PLO.

Conclusion

Although the M2 Bradley Infantry Fighting Vehicle is now entering service in large numbers, with some 7,000 to be built, the M113 will remain in service until well into the 21st century as it is more than adequate for many of the traditional battlefield roles such as the transportation of troops from one part of the battlefield to another. It will probably go down in history as the most widely deployed armoured vehicle ever built.

USA

M2 Bradley Infantry Fighting Vehicle



Above: An M2 Bradley Infantry Fighting Vehicle with the twin TOW launcher retracted. This vehicle is entering service in increasing numbers with the US Army, with 600 vehicles being produced.

For many years the United States had a requirement for a mechanized infantry combat vehicle, but it is only in the last two years that this ambition has been realized with the introduction into service of the **M2 Bradley Infantry fighting Vehicle**. Back in the early 1960s prototypes of the **MICV-65** were designed, built and subsequently tested (as was the XM765 based on the well known M113 APC), but in 1972 FMC was awarded the development contract for a new vehicle called the **XM723**, which was to be armed with a 20-mm cannon. No sooner had prototypes of this been built and started tests than there was another change of plan. At that time the US Army also had a requirement for the **XM800 Armored Reconnaissance Scout Vehicle** (ARSV) and prototypes of both tracked and wheeled vehicles were built and tested. It was then decided to develop a vehicle to meet both the MICV and scout requirements and at the same time a decision was taken that both vehicles would have the same basic hull and be fitted with a two-man turret armed with a 25-mm cannon and a twin TOW ATGW launcher. The chassis of the XM723 was used for both vehicles, the Infantry Fighting Vehicle becoming the **XM2** and the **Cavalry Fighting Vehicle** the **XM3**, with the whole family called the Fighting Vehicle System (FVS). These vehicles were soon standardized as the M2 and **M3**, the first production vehicles coming off the production line at San Jose, California, in 1981. The US Army has a requirement for just under 7,000 of these vehicles and in 1984 production was running at the rate of about 600 per year. The M2 Bradley is almost identical to the M3 except that the latter has no firing port, carries a total of five men (compared with 10 in the M2) and is provided with much more ammunition.

The hull of the M2 is of welded aluminium armour with an additional layer of spaced laminate armour fitted to the hull front, sides and rear to give much increased protection against most battlefield weapons. The driver is at the front of the hull on the left, with the powerpack to his right. The two-man power-operated turret is in the centre of the hull with the commander on the right and gunner on the left. The main armament is a Hughes Helicopter 25-mm dual-feed Chain Gun which can defeat Soviet light armoured vehicles when firing APDS ammunition; there is also a 7.62-mm (0.3-in) co-axial machine-gun and a twin launcher on the left side of turret for the Hughes TOW ATGWs. A stabilization system is fitted which allows the gunner to aim and fire the 25-mm cannon while moving at speed across country. The troop compartment is at the rear and provided with six firing ports and periscopes to allow the embarked men to fire their 5.56-mm (0.22-in) weapons from within the vehicle. A full range of night-vision equipment is fitted for the commander, gunner and driver, and there is an NBC system. The Bradley is a highly effective vehicle and plays a key role in the US Army's combined-arms team concept. It has many critics, though, who say that it is too large, expensive and difficult to maintain, and will be unable to operate with the M60 and M1 tanks as it has much inferior armour protection to these MBTs.

The M2 Bradley IFV has been designed to operate alongside the M1 Abrams Main Battle Tank on the modern battlefield. The twin TOW missile launcher gives the Bradley a significant anti-tank capability.

Specification

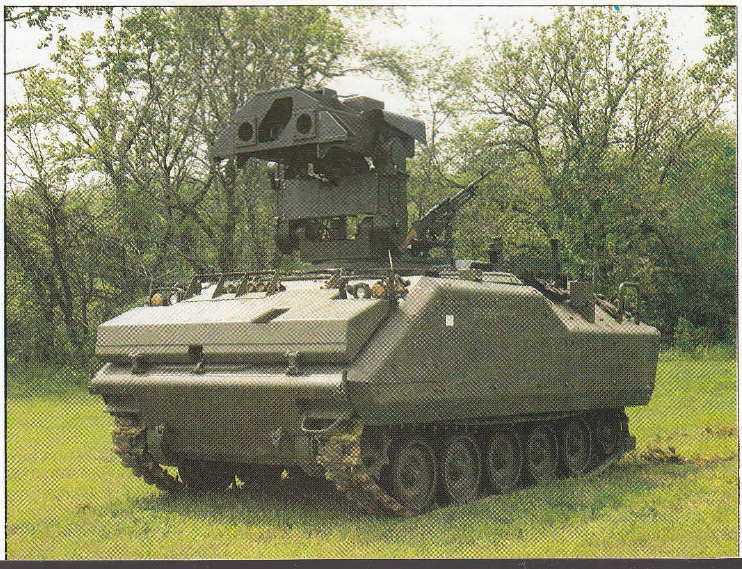
M2 Bradley
Crew: 3+7
Weight: 22666 kg (49,970 lb)
Powerplant: one Cummins VTA-903T 8-cylinder diesel developing 500 hp 9373 kW)
Dimensions: length 6.453 m (21 ft 2 in); width 3.20 m (10 ft 6 in); height (overall) 2.972 m (9 ft 9 in)
Performance: maximum road speed 66 km/h (41 mph); maximum range 483 km (300 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.914 m (3 ft 0 in); trench 2.54 m (8 ft 4 in)

USA

Armoured Infantry Fighting Vehicle

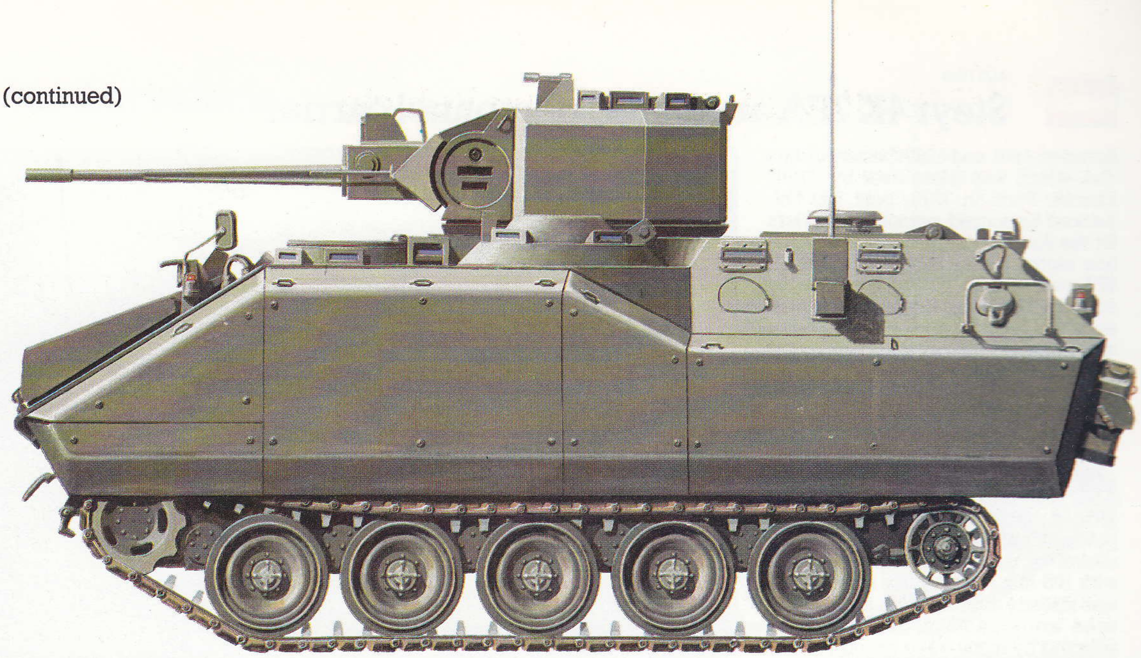
The shortcomings of the M113 armoured personnel carrier were realized by the US Army in the late 1960s, and in 1967 FMC was awarded a contract to build two prototypes of a new vehicle called the **XM765**. This was essentially a M113 with a fully-enclosed weapon station and with the troop compartment at the rear modified for firing ports and observation devices in the upper part of an inward-sloping hull top. The US Army did not adopt this vehicle, however, going on to develop a much heavier and more complex vehicle eventually standardized as the M2 Bradley Infantry Fighting Vehicle, which is also built by FMC Corporation.

FMC realized, though, that the new US Army infantry fighting vehicle would be too complex, heavy and expensive for many countries around the world, so with company funds started a development of the XM765 which finally resulted in the **Product Improved M113A1**. This was not placed in production but did result in another vehicle with rearranged interior layout called the **Armoured Infantry Fighting Vehicle**. Following a number of demonstrations in Europe and elsewhere, the Netherlands became (in 1975) the first country to adopt the



The Dutch army uses a version of the AIFV fitted with the Emerson twin TOW launcher, as fitted to the M901 Improved TOW Vehicles of the US army, which has two missiles in the ready-to-launch position.

Armoured Infantry Fighting Vehicle (continued)



The Armoured Infantry Fighting Vehicle has been developed by the FMC Corporation specifically for the export market, and fills the gap between the basic M113 APC and the more expensive M2 Bradley IFV.

vehicle with an initial order for 850 vehicles. This was followed by the Philippines with an order for about 30 vehicles and in 1981 Belgium ordered 514 AIFVs and 525 M113A2s which are now being built under licence in Belgium.

Like the M113 series, the hull of the AIFV is of welded aluminium armour construction, but in addition has a layer of appliqué steel armour added to the front, sides and rear for increased protection. The driver is at the front left, with the engine to his right and the commander to his rear. The commander has a cupola with observation devices. The power-operated turret is to the right of the commander and is armed with a 25-mm Oerlikon dual-feed cannon; a 7.62-mm (0.3-in) machine-gun is mounted co-axially to the left of the 25-mm cannon. The turret is provided with both day and night observation devices. The seven infantrymen are seated in the rear of the vehicle and enter via a power-operated ramp as in the standard M113. A hatch is provided above the troop compartment, and there are five firing ports with observation devices. A wide range of optional equipment can be fitted including an NBC system, heater and different armament options.

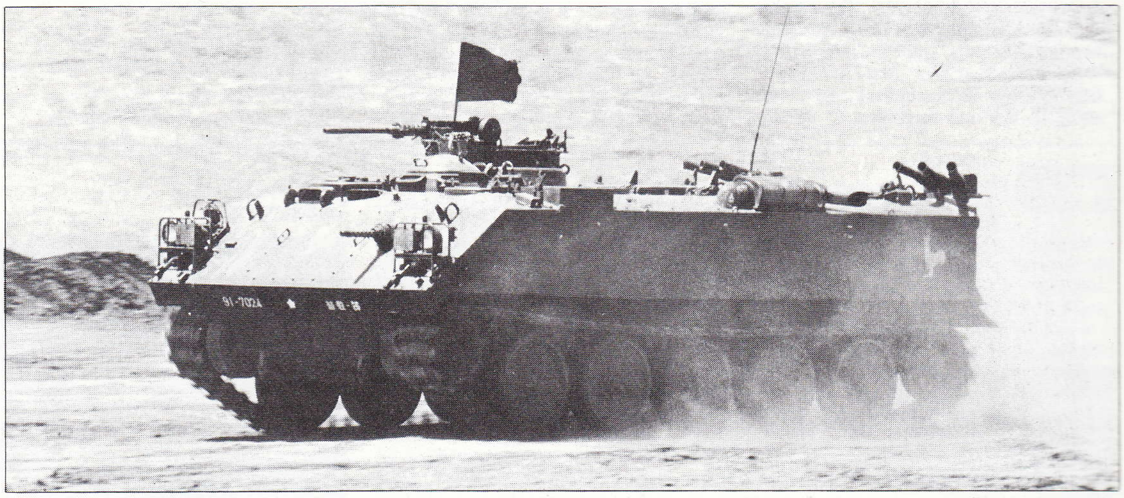
The basic vehicle is fully amphibious, being propelled in the water by its tracks. Compared with the earlier M113 the AIFV has improved armour protection, improved fire power (25-mm cannon in turret instead of a 12.7-mm/0.5-in machine-gun in an unprotected mount) and improved mobility (improved suspension and more powerful engine).

The Dutch army is using the AIFV as the basic member of a whole family of vehicles including an anti-tank vehicle with the Emerson Improved TOW system, a command vehicle, a tractor for the 120-mm (4.72-in) Brandt mortar, a radar vehicle, a cargo carrier and an ambulance.

Specification
AIFV
Crew: 3+7
Weight: 13687 kg (30,175 lb)
Powerplant: one Detroit Diesel 6V-53T V-6 diesel developing 264 hp (207 kW)
Dimensions: length 5.258 m (17 ft 3 in); width 2.819 m (9 ft 3 in); height (overall) 2.794 m (9 ft 2 in)
Performance: maximum road speed 61.2 km/h (38 mph); maximum range 490 km (305 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.635 m (2 ft 1 in); trench 1.625 m (5 ft 4 in)

JAPAN

Type 73 armoured personnel carrier



The Japanese Type 73 APC and the earlier Type SU 60 APC are the only vehicles of their type with a bow-mounted 7.62-mm (0.3-in) machine-gun.

When the Japanese Ground Self-Defense Force was formed in the 1950s its first armoured personnel carriers were half-tracks supplied by the United States. The first Japanese-designed vehicle to enter service was the **Type SU 60** APC which was produced by Mitsubishi Heavy Industries and the Komatsu Manufacturing Corporation, final deliveries being made in the early 1970s. The Type SU 60 is not amphibious, has a four-man crew and can carry six fully equipped troops. Over 400 of these are in service and variants include an NBC detection vehicle, 81-mm and 107-mm (3.19-in and 4.2-in) mortar-carriers and a dozer. The **Type 73** is now supplementing the Type SU 60 but production is at a very low rate, some times as low as six per year, and by 1984 about 150 had been built with production still under way.

The Type 73 has a hull of all-welded aluminium armour with the commander, driver and bow machine-gunner at the front. The 7.62-mm (0.3-in) machine-gun in the bow is unique and can be traversed 30° left, right, up and down, and a similar weapon is installed in the earlier Type SU 60 APC. The engine is towards the front on the left, with troop compartment at the rear. Entry to the latter is via two doors rather than a power-operated ramp as in the M113 APC and M2 Bradley IFV. One of the nine infantrymen normally mans the roof-mounted 12.7-mm (0.5-in) machine-gun, which is on the right side of the vehicle and can be aimed and fired from within the vehicle. The cupola can be traversed through 360° and the weapon elevated from $-10°$ to $+60°$. The infantry are seated on benches down each side of the troop compartment facing each other; the benches can be folded up to allow stores and other equipment to be carried. On each side of the troop compartment are two T-type firing ports, although these have a limited value compared with the firing ports/vision blocks fitted to vehicles such as the West German Marder. Another unusual feature of the Type 73 is that mounted on the very rear of the hull roof on each side is a bank of three electrically-operated smoke-dischargers, which fire forwards. In action these would be fired when the vehicle was under attack so that it could withdraw to the rear.

The Type 73 has night-vision equipment and an NBC system, but is only amphibious after lengthy preparation. This preparation includes flotation aids along side of the hull and attached to the road wheels, a trim vane mounted at the front of the hull, and boxes fitted around the air inlet, air outlet and exhaust pipes on the roof of the vehicle. If the last were not fitted any surge of water over the roof would soon get into the engine.

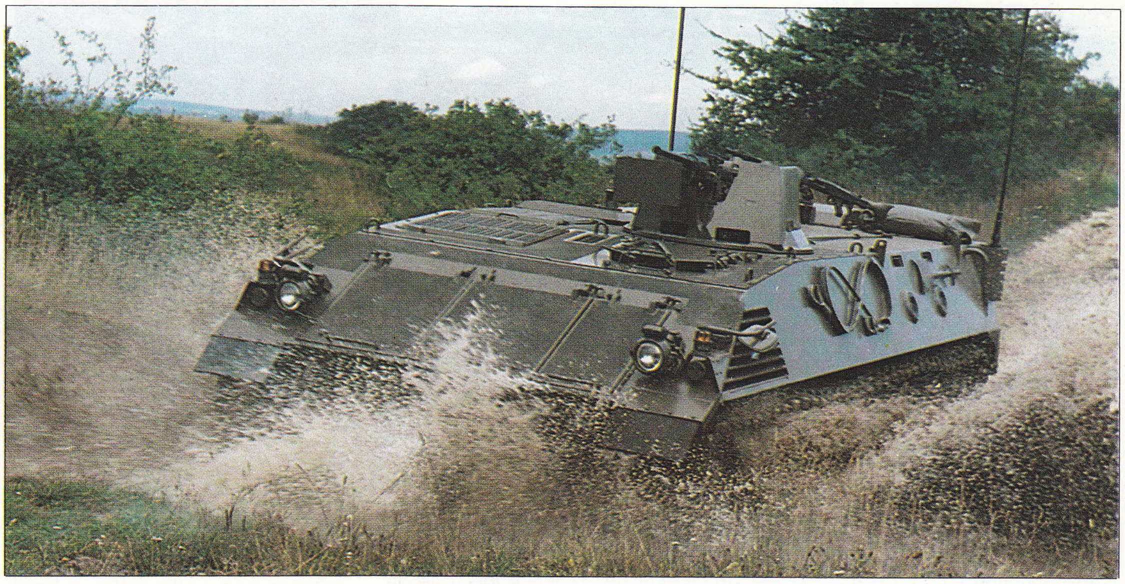
Unlike many current APCs there is only one known variant of the Type 73, namely the **Type 75** self-propelled ground-wind measuring unit that is used with the 130-mm (5.12-in) multiple rocket-launcher and uses some automotive components of the Type 73.

The Type 73 is already obsolete as it lacks both armour protection and fire power. Currently under development by Mitsubishi Heavy Industries is a **Mechanized Infantry Combat Vehicle** that will be armed with the same 25-mm Hughes Helicopters Chain Gun as fitted to the American M2 Bradley Infantry Combat Vehicle already in service with the US Army.

Specification
Type 73
Crew: 3+9
Weight: 13300 kg (29,321 lb)
Powerplant: one Mitsubishi air-cooled diesel developing 300 hp (224 kW)
Dimensions: length 5.80 m (19 ft 1 in); width 2.80 m (9 ft 2 in); height (with MG) 2.20 m (7 ft 3 in) and (hull) 1.70 m (5 ft 7 in)
Performance: maximum road speed 70 km/h (45 mph); maximum range 300 km (186 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.70 m (2 ft 4 in); trench 2.00 m (6 ft 7 in)

AUSTRIA

Steyr 4K 7FA armoured personnel carrier


The Steyr-Daimler-Puch 4K 7FA-K SPz infantry fighting vehicle is a further development of the basic 4K 7FA which is used by Austria, Greece (manufactured under licence), Morocco, Nigeria and Tunisia. It shares many common components with the SK 105 tank destroyer.

Between 1961 and 1969 Oesterreichische, which was taken over by Steyr-Daimler-Puch in 1970, built 450 full-tracked armoured personnel carriers for the Austrian army, the final production model being **Schützenpanzer 4K 4FA** with a more powerful engine. In addition to the usual specialized versions, the Austrian army uses two basic models of the 4K 4FA, the **SPz G2** fitted with an Oerlikon-Bührle one-man turret armed with a 20-mm cannon and the **SPz G1** fitted with a 12.7-mm (0.5-in) M2 HB machine-gun.

In 1976 Steyr-Daimler-Puch completed the prototype of the **SPz 4K 7FA** APC which had much improved armour protection as well as the more powerful engine and upgraded transmision of the SK-105 tank destroyer with 105-mm (4.13-in) gun that by then was already in production for the Austrian army and was subsequently adopted by many other countries. The first production 4K 7FA APCs were completed in 1977, and since then sales have been made to Austria, Greece (where the vehicle is manufactured under licence as the **Leonidas**), Nigeria and Tunisia.

The all-welded steel hull of the SPz 4K 7FA provides the crew with protection from 20-mm projectiles over the frontal arc, and accommodates the driver at the front left with the engine to his right and the troop compartment at the rear. The gunner is seated to the rear of the driver, and his cupola is provided with a two-part hatch cover that when in the vertical position provides protection to his sides, the 12.7-mm (0.5-in) machine-gun being provided with a shield to provide frontal protection. On the rear of the gunner's cupola are four smoke-dischargers firing to the rear. The eight troops enter and leave the vehicle through twin doors in the hull rear, and sit in two rows of four down the middle of the vehicle facing outwards. Over the top of the troop compartment is a two-piece hatch cover that opens to each side, and around the roof can be mounted up to four 7.62-mm (0.3-in) machine-guns; to fire these weapons the troops have to expose their heads and shoulders above the roof. Standard equipment includes heating and ventilating systems, and passive night-vision equipment can be installed if required.

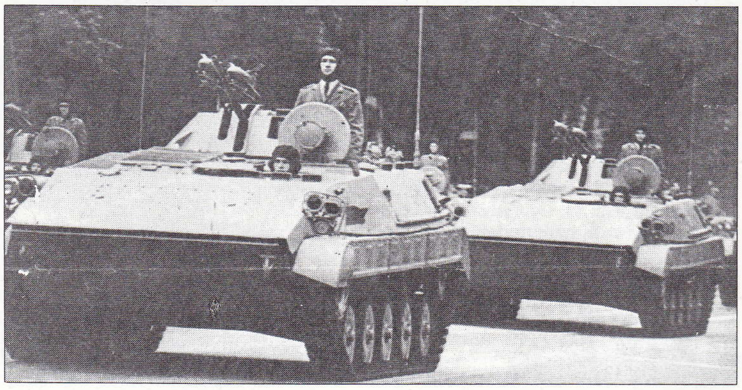
As usual the chassis has been used as the basis for a complete family of vehicles. The infantry fighting vehicle has ball mounts for two rifles in each side of the hull with periscopes above for aiming the weapons. The fire-support model, which has yet to enter production, has a GIAT TS 90 turret armed with a long-barrelled 90-mm (3.54-in) gun that fires APFSDS-T ammunition. There are also command, ambulance (unarmed), mortar-carrier (81-mm/3.19-in and 120-mm/4.72-in) and two anti-aircraft vehicles. Neither of the latter has yet entered production. One is fitted with the French ESD turret and armed with twin 20-mm cannon, while the other has a complete surveillance and tracking system and is armed with twin 30-mm cannon in a turret designed by Thomson-CSF.

Specification

SPz 4K 7FA
Crew: 2+8
Weight: 14800 kg (32,628 lb)
Powerplant: one Steyr 6-cylinder liquid-cooled diesel developing 320 hp (238 kW)
Dimensions: length 5.87 m (19 ft 3 in); width 2.50 m (8 ft 2 in); height (without MG) 1.69 m (5 ft 7 in)
Performance: maximum road speed 63.6 km/h (41 mph); maximum range 520 km (323 miles); fording 1.00 m (3 ft 3 in); gradient 75 per cent; vertical obstacle 0.80 m (2 ft 7 in); trench 2.10 m (6 ft 11 in)

YUGOSLAVIA

M-980 mechanized infantry combat vehicle


A Yugoslav M-980 mechanized infantry combat vehicle, showing the twin launcher for AT-3 'Sagger' ATGWs above the turret roof. The engine is as used in the French AMX-10P.

The first Yugoslav-designed and -built armoured personnel carrier to enter service was the **M-60P**. In appearance and role this was similar to other vehicles developed in this period, such as the American M113, and was designed to transport men across the battlefield where they would dismount and fight on foot. Realizing the obvious shortcomings of this vehicle, Yugoslavia then started design work on a mechanized infantry combat vehicle which finally appeared in 1975 under the designation **M-980**. The short development period was made possible by the decision to incorporate a number of proven components from other sources, often from outside the country. For example, the engine came from Renault (formerly Saviem) of France and is also installed in the GIAT AMX-10P vehicle, while the road wheels are similar to those of the Soviet PT-76 light amphibious tank family and the 'Sagger' ATGW is fitted to a wide number of Soviet vehicles including MICVs, APCs and tank destroyers.

In many respects the design of the M-980 is very similar to that of the Soviet BMP-1, which is also used by Yugoslavia in small numbers. The driver is seated at the front of the vehicle on the left, with the vehicle commander to his rear and the engine to his right. The one-man turret is in the centre of the vehicle and armed with a 20-mm cannon with an elevation of +75° and a depression of −5°; mounted co-axially to the right of this is a 7.62-mm (0.3-in) machine-gun. The high elevation of these weapons enables them to be used against low-flying aircraft and helicopters. Mounted externally on the right rear of the turret are two Soviet AT-3 'Sagger' wire guided anti-tank missiles. The troop compartment is at the rear, and entry to this is via two doors in the hull rear. Over the top of the troop compartment are roof hatches and firing ports (with periscopes above) to enable the troops to fire their weapons from within the vehicle.

The M-980 is fully amphibious, being propelled in the water by its tracks; before the vehicle enters the water a trim vane is erected at the front of the hull and the bilge pumps are switched on. It is also fitted with a fire-extinguishing system, an NBC pack and a smokelaying system.

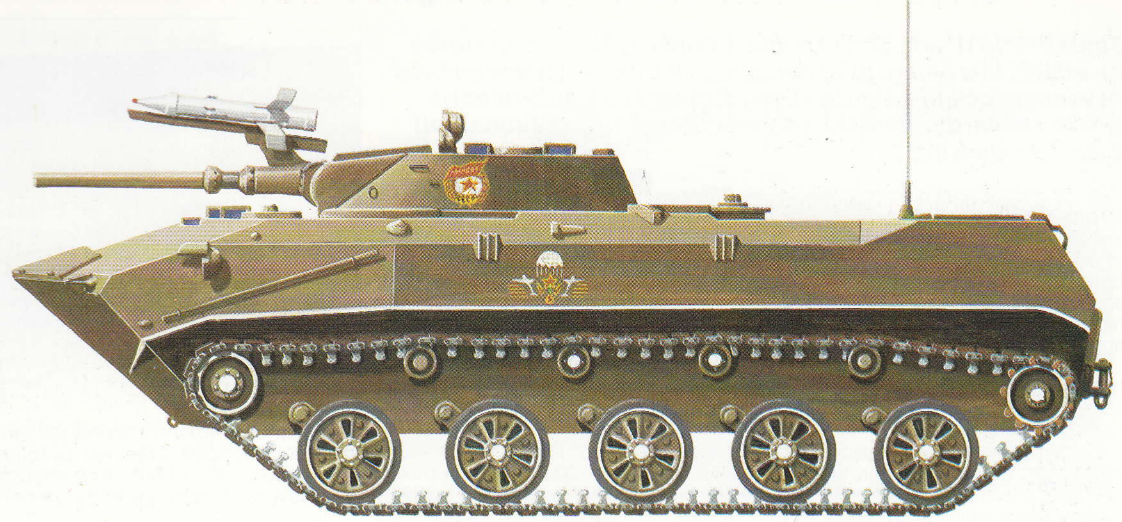
As far as it is known there are no variants of the M-980, although command vehicles and other specialized versions probably exist. In some respects this vehicle is an improvement over the Soviet BMP-1 as it has two rather than one 'Sagger' missile in the ready-to-launch position, and its 20-mm cannon is probably more suited to the role of the vehicle than the 73-mm (2.87-in) gun of the BMP-1. It is of note that the latest Soviet BMP has had the 73-mm (2.87-in) weapon replaced by a smaller 30-mm calibre gun, and most Western vehicles of this type are armed with weapons in the 20- to 30-mm range rather than heavy weapons such as the 73-mm (2.87-in) gun of the BMP-1.

Specification

M-980
Crew: 2+8
Weight: 13000 kg (28,660 lb)
Powerplant: one HS 115-2 V-8 diesel developing 260 hp (194 kW)
Dimensions: length 6.40 m (21 ft 0 in); width 2.59 m (8 ft 6 in); height (overall) 2.50 m (8 ft 2 in)
Performance: maximum road speed 60 km/h (37 mph); maximum range 500 km (310 miles); fording amphibious; vertical obstacle 0.80 m (2 ft 8 in); trench 2.20 m 7 ft 3 in)

USSR

BMD airborne combat vehicle



The BMD airborne combat vehicle is used only by the Soviet Air Assault Divisions and has been operated extensively in Afghanistan. Its turret is similar to that fitted to the BMP-1 MICV, although some BMDs have a roof-mounted Spigot ATGW in place of the AT-3 'Sagger' ATGW.

The Soviet Union has for some time placed great emphasis on its airborne forces, and for many years has had at least seven airborne divisions maintained at full strength. In the past the only armoured vehicles these divisions have used have been the 57-mm ASU-57 or the 85-mm (3.35-in) ASU-85 or the 85-mm (3.35-in) ASU-85 self-propelled anti-tank guns. To give these units increased firepower and mobility once they have been landed behind enemy lines the **BMD** airborne combat vehicle was designed, and this entered service in 1970. Today each Soviet airborne rifle division has 330 of these vehicles in various configurations, although it is uncertain whether or not all seven of these divisions have their full complement of vehicles. While the Soviet Union has considerable airborne forces, it does not have the capability to lift more than one airborne rifle division at any one time. The BMD was used to spearhead the invasion of Afghanistan in 1979, and there is also evidence that it has been used operationally elsewhere.

The layout of the vehicle is unusual, the driver being seated at the front of the hull in the centre with the commander to his left and the bow machine-gunner to his right. The latter operates the two single 7.62-mm (0.3-in) machine-guns mounted internally at the front of the hull, one on each side. The turret, which is identical to that fitted to the BMP-1, is in the centre of the hull and is armed with a 73-mm (2.87-in) gun, a 7.62-mm (0.3-in) co-axial machine-gun and a launcher rail for the AT-3 'Sagger' ATGW mounted above the main gun. To the rear of the turret is a small compartment with seats for the senior gunner, the grenade-launcher and his assistant; the only means of entry to this compartment is via the concertina type roof hatch. The independent suspension of the BMD consists of five road wheels, with drive sprocket at the rear and idler at the front; there are four track-return rollers. An unusual feature of this suspension is that a hydraulic system is incorporated that allows the ground clearance of the vehicle to be altered from 100 mm to 450 mm (4 in to 18 in), a factor of some importance for airborne operations.

The BMD is fitted with an NBC system and a full range of night-vision equipment. It is also fully amphibious, the only preparation required being the erection of the trim vane at the front of the hull and the engagement of the bilge pump.

The command version of the BMD is called the **BMD-U** (command), and this has a longer chassis with six road wheels on each side and no turret. There is also an 82-mm (3.23-in) mortar version that has seen action in Afghanistan. More recently some BMDs have been observed with the launcher rail for the 'Sagger' ATGW replaced by that for a shorter-range AT-4 'Spigot' on the turret roof; if required the launcher can be dismounted for use in the ground role.

The BMD can be carried slung under a heavy-lift helicopter or dropped from transport aircraft by parachutes; the Antonov An-22 'Cock' is believed to be able to carry at least three BMDs.

Specification

BMD

Crew: 7

Weight: 6700 kg (14,771 lb)

Powerplant: one V-6 liquid-cooled diesel developing 240-hp (179 kW)

Dimensions: length 5.40 m (17 ft 9 in); width 2.63 m (8 ft 8 in); height 1.62 m to 1.97 m (5 ft 4 in to 6 ft 6 in)

Performance: maximum road speed 70 km/h (43 mph); maximum range 320 km (200 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.80 m (2 ft 8 in); trench 1.60 m (5 ft 3 in)

USSR

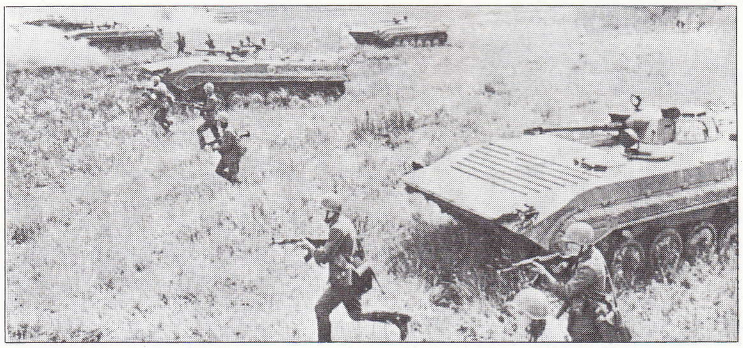
BMP-1 mechanized infantry fighting vehicle

The **BMP-1** was developed as the replacement for the BTR-50 armoured personnel carrier and caused a major stir throughout Western armies when it rolled through Red Square for the first time in 1967. Previous armoured personnel carriers simply transported the infantry to a point near the scene of action, where it dismounted to attack the objective on foot. The BMP-1 not only has firing ports that allow all of the embarked troops to fire their weapons from within the vehicle in relative safety, but also a 73-mm (2.87-in) cannon and a wire-guided anti-tank missile. Since the introduction of the BMP-1 several countries have also developed mechanized infantry combat vehicles: the West German Marder (20 mm cannon), the French AMX-10P (20-mm cannon) and most recently the US M2 Bradley (25-mm cannon) are all good examples. The Marder has recently been fitted with an externally mounted MILAN ATGW, but although this is more accurate than the 'Sagger' fitted to the BMP-1 it has a shorter range. The M2 has a twin launcher for the TOW ATGW which has a longer range than the 'Sagger' and is much more accurate.

The layout of the BMP-1 is unusual, wtth the driver at front left, the commander to his rear and the engine on the right. The turret is in the centre of the hull and the infantry compartment at the rear. The eight infantrymen are seated four down each side, back to back, and enter the vehicle via twin doors in the hull rear. Over the top of the troop compartment are roof hatches. The main drawback of this arrangement is that the troop commander is out of immediate contact with the men he must command in battle. The 73-mm (2.87-in) gun is fed from a magazine that holds 40 rounds of HEAT (high explosive anti-tank) or HE-FRAG (high explosive fragmentation) ammunition, and there is a 7.62-mm (0.3-in) co-axial machine-gun. Turret traverse is electric, with manual controls for emergency use. The main drawbacks of the 73-mm (2.87-in) low-pressure gun are its low muzzle velocity and its lack of accuracy in high winds. To fire with any chance of a first-round hit the BMP-1 must first halt. The 'Sagger' ATGW is mounted on a launcher rail over the 73-mm (2.87-in) gun and controlled (via a joystick) by the gunner. The missile has a maximum range of 3000 m (3,280 yards), but takes 27 seconds to reach this range.

The BMP-1 is fitted with a full range of first-generation infra-red night-vision equipment for the commander, gunner and driver, as well as an NBC system. It is fully amphibious with hardly any preparation, being propelled in the water by its tracks.

In addition to the basic BMP-1 there are also command versions of the vehicle, a radar carrier fitted with two-man turret armed with a 7.62-mm (0.3-in) machine-gun and fitted with a 'Small Fred' mortar/artillery-location radar on turret rear, and a reconnaissance vehicle that has a new two-man turret fitted with the same 73-mm (2.87-mm) gun. Shown for the first time in the 1982 Red Square parade was yet another version that is sometimes called the **BMP-2**. This has a new two-man turret armed with a new long-barrelled rapid-fire cannon with a 'Spandrel' ATGW launcher mounted on the turret roof, and fitted with three smoke-dischargers on each side of the turret.



Soviet BMP-1 mechanized infantry combat vehicles in support of their dismounted infantry. In this photograph none of the vehicles have the AT-3 'Sagger' wire-guided anti-tank missile mounted above the 73-mm gun.

Specification

BMP-1

Crew: 3+8

Weight: 13500 kg (29,762 lb)

Powerplant: one 6-cylinder diesel developing 300 hp (224 kW)

Dimensions: length 6.74 m (22 ft 1 in); width 2.94 m (9 ft 8 in); height (overall) 2.15 m (7 ft 1 in)

Performance: maximum road speed 80 km/h (50 mph); maximum range 500 km (248 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.80 m (2 ft 8 in); trench 2.20 m (7 ft 3 in)

Soviet BMPs in Operation

Since World War II, Soviet military thinking has concentrated on attack, this being, to Soviet minds, the only effective method of winning a battle. Hence all equipment and deployment is geared towards offensive use, with the main operational unit being the division.

Excluding air-assault divisions, the Soviet army has two basic types of divisional formations, the tank division and the motorized rifle division. The tank division includes three tank regiments and one motorized rifle regiment with BMP-1s, while the motorized rifle division has one tank and two motorized rifle regiments, one with BTR-60 or BTR-70 (8×8) wheeled armoured personnel carriers and the other with the full-tracked BMP-1 MICV. The BTR-60 and BTR-70 have high road speeds, but lack the cross-country mobility, armour protection and, above all, firepower of the BMP-1.

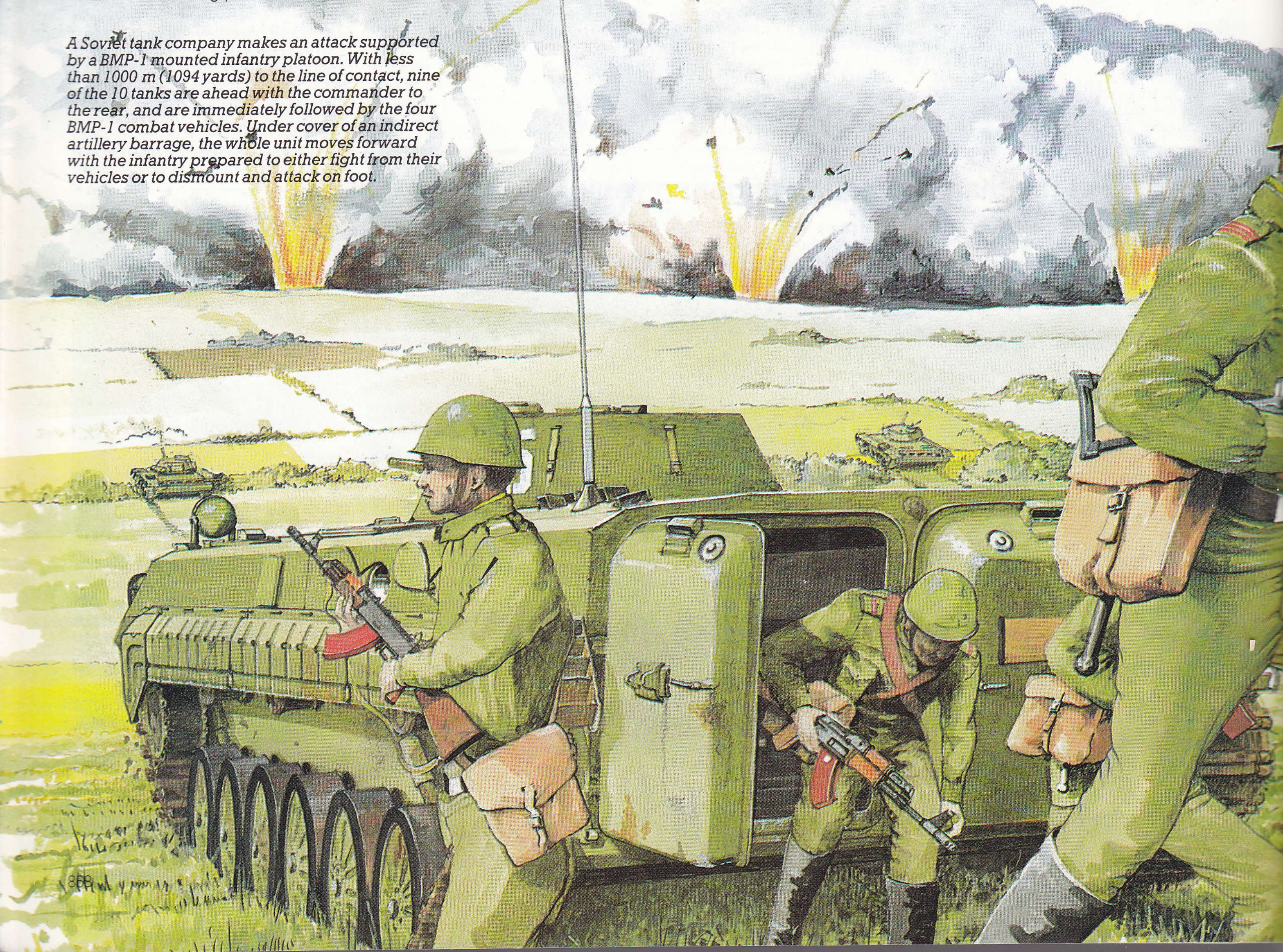
Each motorized rifle regiment includes three motorized rifle battalions, one tank battalion, one 122-mm (4.8-in) self-propelled howitzer battalion with M-1974s, one anti-aircraft battery, one anti-tank battery and the usual support companies and platoons.

Each motorized rifle battalion has a battalion HQ, three rifle companies, one anti-aircraft platoon, one mortar battery (with six towed 120-mm/4.72-in mortars), one automatic grenade-launcher platoon, one communications and supply platoon, workshops and a medical aid station. Each rifle company has an HQ with one BMP and three platoons each with three BMPs. In addition there is one BMP at battalion HQ, three in the automatic grenade-launcher platoon and three in the anti-aircraft platoon (each carrying three SA-7 man-portable surface-to-air missiles). This gives the battalion a total of 37 BMPs and considerable firepower, as the BMP's 73-mm (2.87-in) gun can be used to engage targets with both HEAT and HE-Fragmentation rounds, while its 7.62-mm (0.3-in) co-axial machine-gun can be used against troops and soft-skinned vehicles, and its 'Sagger' ATGW can be used against tanks. In addition there is the firepower of the troops on board each vehicle. The rear troop compartment has a total of nine firing ports in the case of the original BMP-1, and seven in the case of the more recent BMP-2. In the BMP-1 the first man in the rear troop compartment uses his 7.62-mm (0.3-in) PKM machine-gun while the three to his rear use their 7.62-mm (0.3-in) AKM assault rifles. In addition, the rear infantryman on the left side also has a firing port in the door.

Soviet infantry advance across the snow with their MT-LB multi-purpose armoured vehicles to the rear. In some parts of the Soviet Union the MT-LB is used in place of the BMP-1 as it is much lighter and has a lower ground pressure, both essential when operating in snow conditions.

The Soviets believe that offensive action is the most decisive form of combat and expect to advance in Europe at the rate of 30 to 50 km (18.6 to 31 miles) per day in a non-tactical nuclear conflict and at the rate of 50 km to 80 km (31 to 50 miles) per day in a tactical nuclear conflict. To achieve this rate of advance key points are selected, often where the enemy is weakest or where there is a divisional or corps boundary, and forces allocated for the attack so that the enemy is completely outnumbered. Where possible special operations forces, or airborne and helicopter-carried troops, would be inserted well to the rear of the enemy troops not only to inflict damage and create confusion, but also to stop reinforcements being brought forward.

The Soviet motorized rifle battalion is a key element, but on its own lacks tanks and artillery, so it would normally operate as part of the motorized rifle regiment or division. It can, however, be allocated a tank company or a 122-mm (4.8-in) howitzer battalion when it is carrying out specific missions such as acting



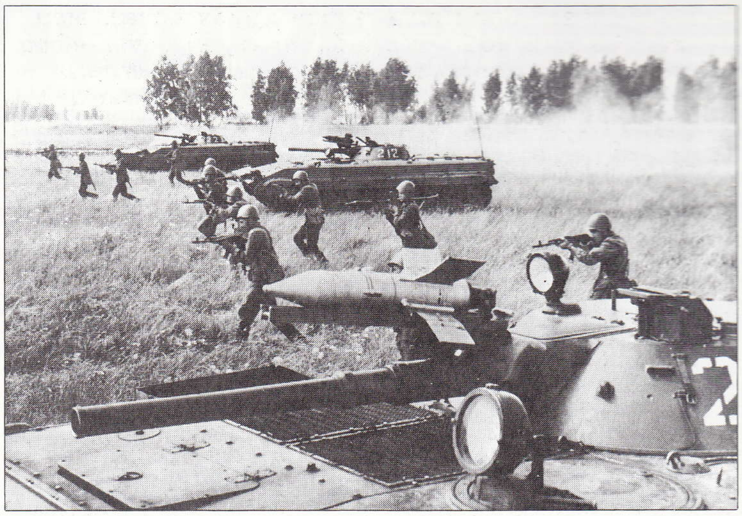
A Soviet tank company makes an attack supported by a BMP-1 mounted infantry platoon. With less than 1000 m (1094 yards) to the line of contact, nine of the 10 tanks are ahead with the commander to the rear, and are immediately followed by the four BMP-1 combat vehicles. Under cover of an indirect artillery barrage, the whole unit moves forward with the infantry prepared to either fight from their vehicles or to dismount and attack on foot.

as a forward detachment, or as an advance, flank or rear guard.

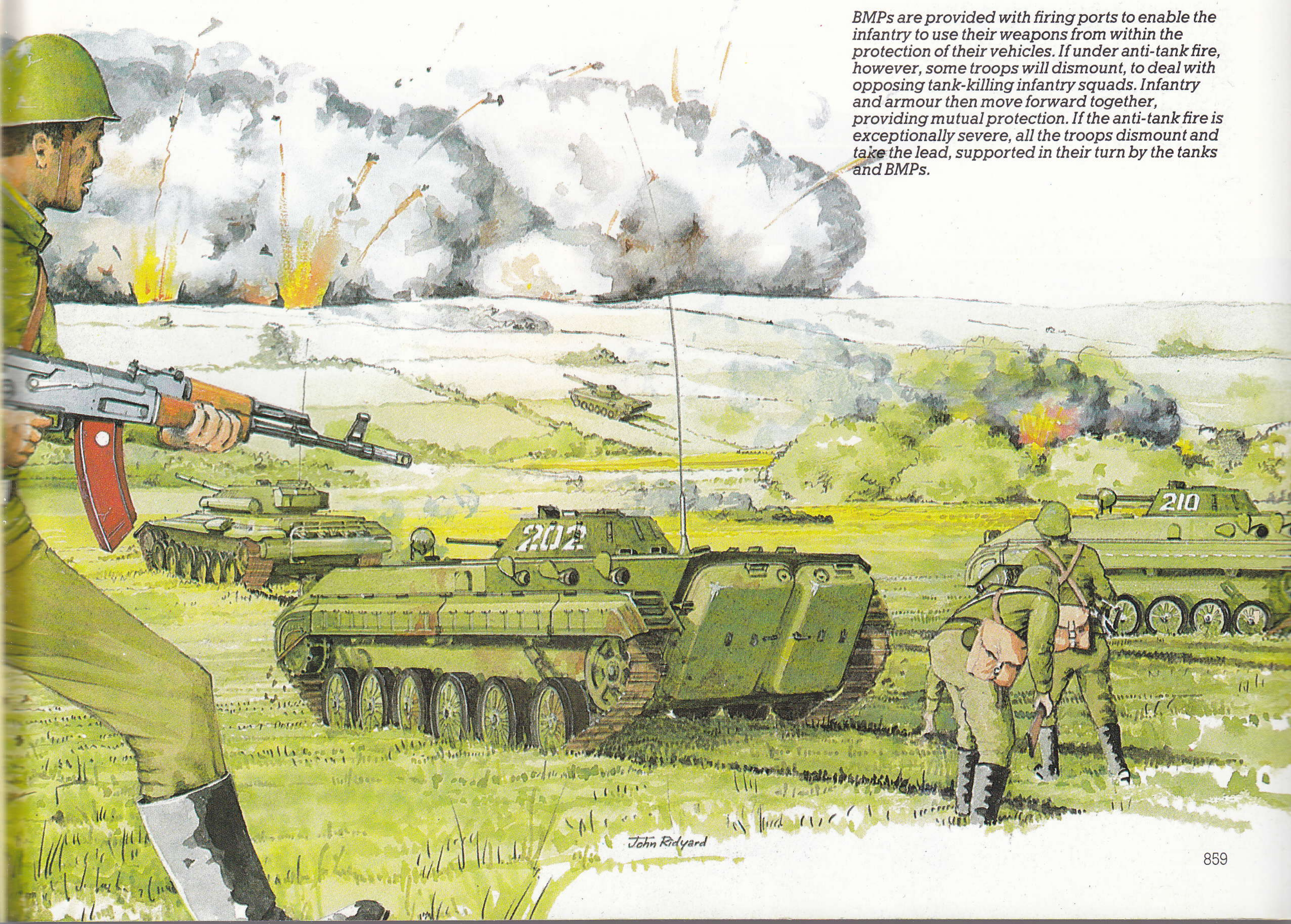
There are three basic dispositions used by the Soviet ground forces, namely the march, approach march and combat. The march is normally used when enemy contact is not expected, although the units are always ready to fight. As the unit is vulnerable on the march this is often carried out during the night or in periods of bad visibility. Vehicles are normally in column with intervals of 50 m (55 yards) when travelling on roads and as much as 100 m (110 yards) when travelling cross country, so limiting the amount of damage that can be done by a single bomb or artillery projectile. When contact with the enemy is imminent, the unit changes to the approach march formation depending, of course, on the tactical situation. This means that the battalion would be dispersed laterally and could be in line, echelon (left or right), wedge or inverted wedge formation. Combat formation takes place when the column deploys in linear formation and is echeloned in depth. Such formations would probably include first and second echelons, reserves and, of course, artillery.

The Soviet army also has three basic types of combat action, namely the meeting engagement, the offensive and defensive, with by far the greatest emphasis placed on the first two of these. In the case of the meeting engagement, the enemy has probably not had time fully to prepare a defensive plan, so time is crucial. The BMPs would move towards the objective with the troops still in their vehicles and tanks to the rear. Artillery and mortar fire would rain down onto the enemy positions until the last possible moment. If heavy anti-tank fire were encountered, then the infantry would dismount from their vehicles and advance on foot and always try to stay within 200 m (220 yards) of the tanks for mutual support. If anti-tank fire were intense, then the BMPs and tanks would stay more to the rear while the infantry attacked on foot. In a typical attack in a non-nuclear situation, the battalion frontage would be about 1 km (0.6 miles) with two BMP companies in the first echelon and the third acting as the second echelon or the reserve. All three companies would attack in line ahead, each company having a frontage of 500 m (550 yards) with a gap of 200 m (220 yards) between the companies. The outcome of the attack would result in the enemy position being overrun, or the enemy retreating, or the attack being repulsed. In the first two cases the motorized rifle battalion would resume the march or launch pursuit operations so that the enemy would have no time to re-form. If the attack were repulsed, then the battalion would attempt to inflict the maximum possible casualties on the enemy until the regiment was brought up and another attack carried out.

A Soviet tank company is often supported by a mechanized infantry platoon of BMPs. The tanks would lead the column with the BMPs to the rear. About 3 km (1.86 miles) from the line of contact the tanks would move into platoon columns with three lines of three tanks and one in the centre at the rear; behind the tanks would be the four BMPs. Less than 1 km (0.6 miles) from the line of contact the tanks and BMPs would move into a line assault formation, the front line consisting of nine tanks, with the tenth to the rear in the centre and the four BMPs to the rear of the tanks. The infantry, dismounted or mounted, would follow the tanks to the objective. All the time the artillery would provide indirect artillery fire.



Soviet BMP-1 MICVs provide fire support to dismounted infantry. The AT-2 'Sagger' ATGW mounted over the 73-mm gun can only be launched when the vehicle is stationary and once launched takes 27 seconds to reach its maximum range of 3000 m (3,280 yards).



BMPs are provided with firing ports to enable the infantry to use their weapons from within the protection of their vehicles. If under anti-tank fire, however, some troops will dismount, to deal with opposing tank-killing infantry squads. Infantry and armour then move forward together, providing mutual protection. If the anti-tank fire is exceptionally severe, all the troops dismount and take the lead, supported in their turn by the tanks and BMPs.

USSR

BTR-50PK armoured personnel carrier

The **BTR-50P** was the first full-tracked armoured personnel carrier to enter service with the Soviet army in the mid-1950s, and is essentially the chassis of the PT-76 amphibious light tank with its turret removed and a superstructure added to the forward part. The commander and driver are seated under armour protection at the front of the vehicle, while the 10 infantrymen are seated in the troop compartment on bench seats that run across the width of the vehicle. The main drawback of this model is the complete lack of any overhead armour protection for the infantry carried and additionally there is no NBC system. The main armament consists of a 7.62-mm (0.3-in) machine-gun on a pintle mount at the front of the crew compartment. On the rear engine decking ramps are provided so that a 57-mm (2.24-in) or 85-mm (3.35-in) anti-tank gun could be carried and, if required, even fired from the vehicle. The next major model to enter service was the **BTR-50PK**, which has a fully enclosed troop compartment and is fitted with an NBC system. Armament consists of a roof-mounted 7.62-mm (0.3-in) machine-gun that provides no protection for the gunner. The Czechs have also built an improved version of the BTR-50PK called the **OT-62**, this being distinguishable from the Soviet vehicle by its lack of chamfer between the side and top of the hull. There are two command versions of the vehicle called the **BTR-50PU** (command) **Model 1** and **BTR-50PU Model 2**. Both of these have a fully enclosed crew compartment, the former having one projecting bay and the latter two. These command vehicles have additional communications equipment and can be recognized by their radio aerials, external stowage and a generator; the last removes the need for the main engine to be run when the vehicle is being used in the static mode.

The basic vehicle has been out of production for some time, and in many Soviet units the type has been replaced by the BMP-1 MICV. Two new versions have recently been noticed by Western intelligence, however, these being the **MTK** mine-clearing vehicle and the **MTP** technical support vehicle. The former is fitted with a launcher on the rear deck that fires explosive tubes across the minefield: these fall to the ground and are then detonated, hopefully detonating the mines in the process. In concept this is similar to the British Giant Viper system. The MTP has much higher roof with chamfered sides and supports the BMP in the forward battlefield area, it having better cross-country capability than the trucks normally used in this role.

Even in 1984, the BTR-50P and its variants are still used by some 30 countries in Europe, the Middle East and elsewhere. The type was used in Vietnam by the North Vietnamese army and in the Middle East campaigns by Syria and Egypt. The last used the BTR-50P with some success in crossing the Suez Canal during 1973. Whereas most western APCs (such as the American M113 and British FV432) are propelled in the water by their tracks, the BTR-50P is propelled in the water by waterjets at a speed of 11 km/h (6.8 mph).

Specification
BTR-50PK

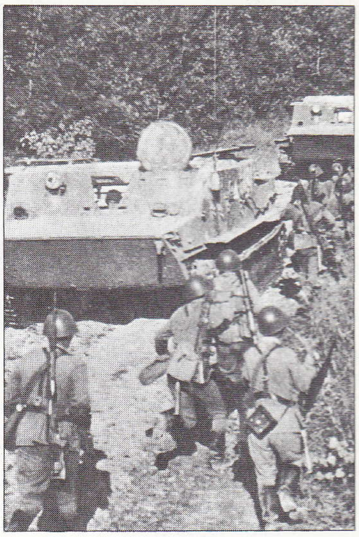
Crew: 2+10

Weight: 14200 kg (31,305 lb)

Powerplant: one Model V-6 6-cylinder inline water-cooled diesel developing 240 hp (179 kW)

Dimensions: length 7.08 m (23 ft 0 in); width 3.14 m (10 ft 4 in); height (without armament) 1.97 m (6 ft 6 in)

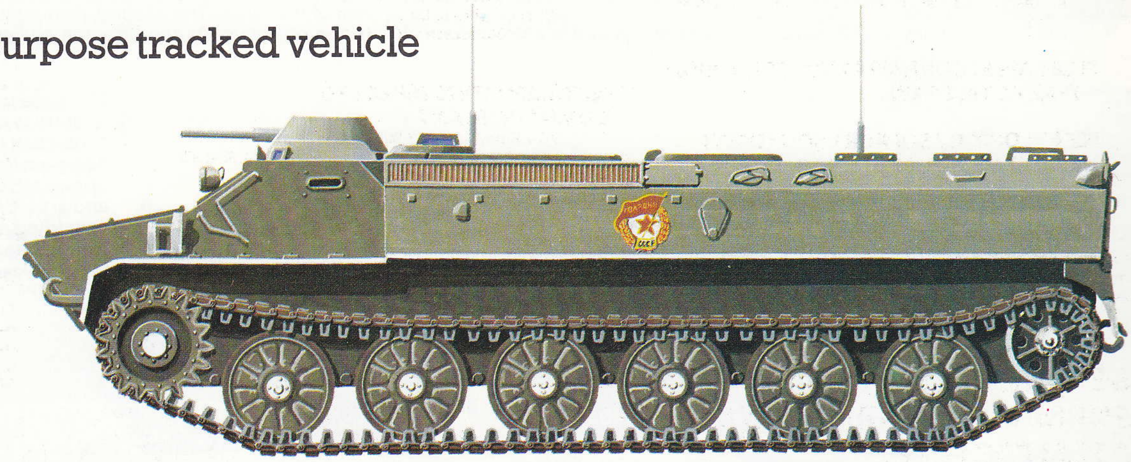
Performance: maximum road speed 44 km/h (27 mph); maximum range 400 km (273 miles); fording amphibious; gradient 70 per cent; vertical obstacle 1.10 m (3 ft 7 in); trench 2.80 m (9 ft 2 in)



Soviet BTR-50PK armoured personnel carriers. This model has overhead armour protection for the troop compartment. The original BTR-50P has an open-topped troop compartment, which makes the 10 seated infantry men very vulnerable to shells and mortar bombs bursting overhead.

USSR

MT-LB multi-purpose tracked vehicle



Above: The MT-LB multi-purpose armoured vehicle is a member of a family of vehicles that all share the same automotive components.

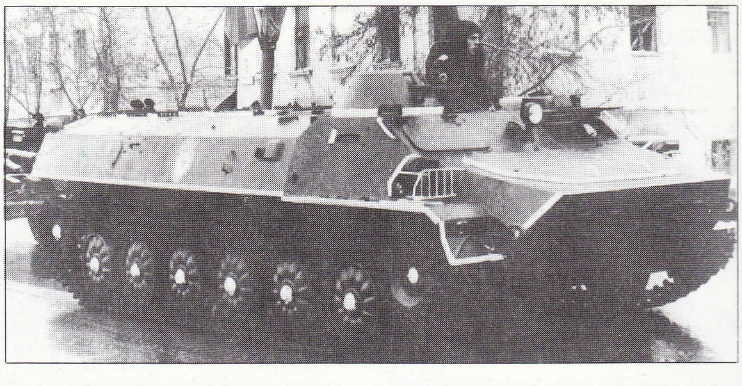
In the period immediately after World War II the Soviets introduced the AT-P armoured tracked artillery tractor, which could tow anti-tank guns and howitzers up to 122 mm (4.8 in) in calibre. This has now been replaced by the **MT-LB** multi-purpose armoured vehicle, which is used for a wide range of roles in addition to its role of towing anti-tank guns such as the 100-mm (3.9-in) T-12.

The crew compartment is at the front, with the engine to the rear of this on the left and the troop compartment at the rear. The 11 infantrymen are seated on canvas seats down each side of the troop compartment that can be folded up to allow cargo to be carried. The infantry can quickly leave the vehicle through two large doors in the hull rear, and two hatches are provided over the top of their compartment. Mounted at the front of the hull on the right side is a manually-operated turret armed with a 7.62-mm (0.3-in) machine-gun. The road wheels are similar to those on the PT-76 amphibious light tank and the BTR-50 series armoured personnel carrier. The torsion-bar suspension consists of six road wheels, with the drive sprocket at the front and idler at the rear. The MT-LB is normally fitted with 350-mm (13.8-in) wide tracks, but when operating on snow-covered ground these can be replaced by the much wider 565-mm (22.25-in) wide tracks, which give a lower ground pressure and therefore better mobility.

The MT-LB is fully amphibious, being propelled in the water by its tracks at a speed of between 5 and 6 km/h (3 to 4 mph), and has infra-red night vision equipment and an NBC system.

In some areas of the Soviet Union where terrain is swampy or normally covered by snow, the MT-LB is used in place of the BMP mechanized infantry combat vehicle.

As usual the MT-LB chassis has been used for a number of specialized applications including the **MT-LBU** (command), **MT-SON** with 'Pork Trough' radar mounted on roof, MT-LB with 'Big Fred' artillery/mortar locating radar on roof at rear, MT-LB armoured engineer vehicle with dozer blade and **MTL-LB** repair vehicle. The last is used for repair and recovery operations in the forward area and fitted (at the front) with an A frame, plus a winch and a full range of tools and other specialized equipment. The chassis is also used as the basis for the SA-13 surface-to-air missile system that has four missiles in the ready-to-launch position. Automotive components of the MT-LB, including the engine and transmission, are also used in the 122-mm (4.8-in) 2S1 self-propelled howitzer which entered service in the 1970s and is now widely used by the Soviet Union as well as being exported to many countries.



The MT-LB amphibious vehicle is used for a wide range of roles such as artillery prime mover, command post, cargo carriers and an armoured personnel carrier.

Specification
MT-LB

Crew: 2+11

Weight: 11900 kg (26,235 lb)

Powerplant: one V-8 diesel developing 240 hp (179 kW)

Dimensions: length 6.454 m (21 ft 2 in); width 2.85 m (9 ft 4 in); height (turret) 1.865 m (6 ft 5 in)

Performance: maximum road speed 61.5 km/h (38 mph); maximum range 500 km (310 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.70 m (2 ft 3 in); trench 2.70 m (8 ft 10 in)

US Naval Aviation
Part 3

COMMANDER NAVAL AIR FORCE, ATLANTIC FLEET

NORFOLK, Va (COMNAVAIRLANT)

FLEET TACTICAL SUPPORT WING ONE, NORFOLK, VA

PATROL WINGS ATLANTIC FLEET, BRUNSWICK, Me
Patrol Wing Five, Brunswick, Me
Patrol Wing Eleven, Jacksonville, Fl
Patrol Squadron Thirty, Jacksonville, Fl

TACTICAL WINGS ATLANTIC FLEET, OCEANA, Va
Carrier Airborne Early Warning Wing Twelve, Norfolk, Va
Fighter Wing One, Oceana, Va
Light Attack Wing One, Cecil Field, Fl
Medium Attack Wing One, Oceana, Va

SEA-BASED AIR ANTI-SUBMARINE WARFARE WINGS ATLANTIC FLEET, JACKSONVILLE, Fl
Air Anti-submarine Warfare Wing One, Cecil Field, Fl
Helicopter Anti-submarine Warfare Wing One, Jacksonville, Fl
Helicopter Sea Control Wing One, Norfolk, Va
Helicopter Tactical Wing One, Norfolk, Va
Air Test and Evaluation Squadron One, Patuxent River, Md

FLEET AIR RECONNAISSANCE SQUADRON TWO, ROTA, SPAIN

FLEET LOGISTIC SUPPORT SQUADRON TWENTY-FOUR, SIGONELLA, SICILY

HELICOPTER COMBAT SUPPORT SQUADRON FOUR, SIGONELLA, SICILY
Note: Last three units all report for administrative purposes only; operational control lies with Commander Fleet Air Mediterranean

FLEET TACTICAL SUPPORT WING ONE

NORFOLK, Va
VAQ-33 Key West, Fl (ERA-3B, TA-3B, P-3A, EA-6A, TA-4J, EA-4F)
VC-6 Norfolk, Va (pilotless drones)
VC-8 Roosevelt Roads, PR (TA-4J)
VC-10 Guantanamo Bay, Cuba (TA-4J)
VQ-4 Patuxent River, Md (EC-130Q)
VRC-40 Norfolk, Va (C-1A, CT-39)
VRF-31 Norfolk, Va (ferry unit)
VXN-8 Patuxent River, Md (RP-3A/D, P-3A)

PATROL WINGS ATLANTIC FLEET

BRUNSWICK, Me
Patrol Wing Five, Brunswick, Me
VP-8 Brunswick, Me (P-3C)
VP-10 Brunswick, Me (P-3C)
VP-11 Brunswick, Me (P-3C)
VP-23 Brunswick, Me (P-3C)
VP-26 Brunswick, Me (P-3C)
VP-44 Brunswick, Me (P-3C)
Patrol Wing Eleven, Jacksonville, Fl
VP-5 Jacksonville, Fl (P-3C)
VP-16 Jacksonville, Fl (P-3C)
VP-24 Jacksonville, Fl (P-3C)
VP-45 Jacksonville, Fl (P-3C)
VP-49 Jacksonville, Fl (P-3C)
VP-56 Jacksonville, Fl (P-3C)
(Direct Reporting Unit)
VP-30 Jacksonville, Fl (P-3A/B/C)

UNITS REPORTING DIRECT TO COMNAVAIRLANT

VQ-2 Rota, Spain (EP-3E, EA-3B)
VR-24 Sigonella, Sicily (C-1A, C-2A, CT-39G, RH-53D)
VR-24 Det Rota, Spain (C-130F)
HC-4 Sigonella, Sicily (CH-53E)
Note: These three units all report to COMNAVAIRLANT for administrative purposes and to Commander Fleet Air Mediterranean for operational purposes)

TACTICAL WINGS ATLANTIC FLEET

OCEANA, Va
Carrier Airborne Early Warning Wing Twelve, Norfolk, Va
RVAW-120 Norfolk, Va (E-2C, TE-2C) Training
VAW-121 Norfolk, Va (E-2C) CVW-7
VAW-122 Norfolk, Va (E-2C) CVW-6
VAW-123 Norfolk, Va (E-2C) CVW-1
VAW-124 Norfolk, Va (E-2C) CVW-8
VAW-125 Norfolk, Va (E-2C) CVW-17
VAW-126 Norfolk, Va (E-2C) CVW-3
VAW-127 Norfolk, Va (E-2C) CVW-13
Fighter Wing One, Oceana, Va
VF-11 Oceana, Va (F-14A) CVW-3
VF-14 Oceana, Va (F-14A) CVW-6
VF-31 Oceana, Va (F-14A) CVW-3
VF-32 Oceana, Va (F-14A) CVW-6
VF-33 Oceana, Va (F-14A) CVW-1
VF-41 Oceana, Va (F-14A) CVW-8
VF-43 Oceana, Va (F-5E, A-4F, T-2C, TA-4J) training
VF-74 Oceana, Va (F-14A) CVW-17
VF-84 Oceana, Va (F-14A) CVW-8
VF-101 Oceana, Va (F-14A) Training
VF-102 Oceana, Va (F-14A) CVW-1
VF-103 Oceana, Va (F-14A) CVW-17
VF-142 Oceana, Va (F-14A) CVW-7
VF-143 Oceana, Va (F-14A) CVW-7
Light Attack Wing One, Cecil Field, Fl
VA-12 Cecil Field, Fl (A-7E) CVW-7
VA-15 Cecil Field, Fl (A-7E) CVW-6
VA-37 Cecil Field, Fl (A-7E) CVW-3
VA-45 Key West, Fl (TA-4J) training
VA-46 Cecil Field, Fl (A-7E) CVW-1
VA-66 Cecil Field, Fl (A-7E) CVW-7.
VA-72 Cecil Field, Fl (A-7E) CVW-1
VA-81 Cecil Field, Fl (A-7E) CVW-17
VA-82 Cecil Field, Fl (A-7E) CVW-8
VA-83 Cecil Field, Fl (A-7E) CVW-17
VA-86 Cecil Field, Fl (A-7E) CVW-8
VA-87 Cecil Field, Fl (A-7E) CVW-6
VA-105 Cecil Field, Fl (A-7E) CVW-3
VFA-131 Cecil Field, Fl (F-18A) CVW-13
VFA-132 Cecil Field, Fl (F-18A) CVW-13
VA-174 Cecil Field, Fl (A-7E, TA-7C) training
Medium Attack Wing One, Oceana, Va
VA-34 Oceana, Va (A-6E, KA-6D) CVW-1
VA-35 Oceana, Va (A-6E, KA-6D) CVW-8
VA-42 Oceana, Va (A-6E, TC-4C) training
VA-55 Oceana, Va (A-6E, KA-6D) CVW-13
VA-65 Oceana, Va (A-6E, KA-6D) CVW-7
VA-75 Oceana, Va (A-6E, KA-6D) CVW-3
VA-85 Oceana, Va (A-6E) CVW-3
VA-176 Oceana, Va (A-6E, KA-6D) CVW-6

SEA-BASED AIR ANTI-SUBMARINE WARFARE WINGS ATLANTIC FLEET

JACKSONVILLE, Fl
Air Anti-submarine Warfare Wing One, Cecil Field, Fl
VS-22 Cecil Field, Fl (S-3A) CVW-3
VS-24 Cecil Field, Fl (S-3A) CVW-8
VS-28 Cecil Field, Fl (S-3A) CVW-6
VS-30 Cecil Field, Fl (S-3A) CVW-17
VS-31 Cecil Field, Fl (S-3A) CVW-7
VS-32 Cecil Field, Fl (S-3A) CVW-1
VSSU Cecil Field, Fl (S-3A) training
Helicopter Anti-submarine Warfare Wing One, Jacksonville, Fl
HS-1 Jacksonville, Fl (SH-3H/G) training
HS-3 Jacksonville, Fl (SH-3H) CVW-17
HS-5 Jacksonville, Fl (SH-3H) CVW-7
HS-7 Jacksonville, Fl (SH-3H) CVW-3
HS-9 Jacksonville, Fl (SH-3H) CVW-8
HS-11 Jacksonville, Fl (SH-3H) CVW-1
HS-15 Jacksonville, Fl (SH-3H) CVW-6
HS-17 Jacksonville, Fl (SH-3H) CVW-13
Helicopter Sea Control Wing One, Norfolk, Va
HSL-30 Norfolk, Va (SH-2F)
HSL-32 Norfolk, Va (SH-2F)
HSL-34 Norfolk, Va (SH-2F)
HSL-36 Mayport, Fl (SH-2F)
Helicopter Tactical Wing One, Norfolk, Va
HC-6 Norfolk, Va (CH-46D, VH-3A)
HC-16 Pensacola, Fl (HH-46A, UH-1N)
HM-12 Norfolk, Va (CH-53E, RH-53D)
HM-14 Norfolk, Va (RH-53D)
HM-16 Norfolk, Va (RH-53D)
(Direct Reporting Unit)
VX-1 Patuxent River, Md (SH-2F, EP-3A, P-3C, S-3A, SH-3H)

Almost merging into the grey sea behind, this Sikorsky SH-60B Sea Hawk approaches its mother ship. The newly deployed SH-60B will undertake long-distance anti-submarine warfare missions to prevent enemy submarines closing to firing range.

COMMANDER NAVAL AIR FORCE, PACIFIC FLEET

NORTH ISLAND, Ca (COMNAVAIRPAC)

ANTI-SUBMARINE WARFARE WING PACIFIC, NORTH ISLAND, Ca
FIGHTER AND AIRBORNE EARLY WARNING WING PACIFIC, MIRAMAR, Ca
MEDIUM ATTACK/ELECTRONIC WARFARE WING PACIFIC, WHIDBEY ISLAND, Wa
LIGHT ATTACK WING PACIFIC, LEMOORE, Ca
PATROL WINGS PACIFIC FLEET, MOFFETT FIELD, Ca
Patrol Wing One, Kamiseya, Japan (controls TDY P-3 Squadrons)
Patrol Wing Two, Barbers Point, HI
Patrol Wing Ten, Moffett Field, Ca
Det Adak, Adak, Ak (controls TDY P-3 Squadrons)
FLEET AIR WESTERN PACIFIC, ATSUGI, JAPAN
FLEET CARRIER TRANSPORT SQUADRON THIRTY, ALAMEDA, Ca

ANTI-SUBMARINE WARFARE WING PACIFIC, NORTH ISLAND, Ca

HC-1 North Island, Ca (SH-3G)
HC-1 Det 2 Atsugi, Japan (SH-3G) CVW-5
HC-3 North Island, Ca (CH-46D)
HC-11 North Island, Ca (CH-46D)
HS-2 North Island, Ca (SH-3H) CVW-2
HS-4 North Island, Ca (SH-3H) CVW-15
HS-6 North Island, Ca (SH-3H) CVW-11
HS-8 North Island, Ca (SH-3H) CVW-9
HS-10 North Island, Ca (SH-3G/H) training
HS-12 North Island, Ca (SH-3H) CVW-14
HSL-31 North Island, Ca (SH-2F)
HSL-33 North Island, Ca (SH-2F)
HSL-35 North Island, Ca (SH-2F)
HSL-37 Barbers Point, HI (SH-2F)
HSL-41 North Island, Ca (SH-60B)
VS-21 North Island, Ca (S-3A) CVW-11
VS-29 North Island, Ca (S-3A) CVW-15
VS-33 North Island, Ca (S-3A) CVW-9
VS-37 North Island, Ca (S-3A) CVW-14
VS-38 North Island, Ca (S-3A) CVW-2
VS-41 North Island, Ca (S-3A) training
VXE-6 Point Mugu, Ca (LC-130F/R, UH-1N)

FIGHTER AND AIRBORNE EARLY WARNING WING PACIFIC, MIRAMAR, CA

RVAW-110 Miramar, Ca (E-2B/C, TE-2A) training
VAW-112 Miramar, Ca (E-2C) CVW-9
VAW-113 Miramar, Ca (E-2C) CVW-14
VAW-114 Miramar, Ca (E-2C) CVW-15
VAW-115 Atsugi, Japan (E-2B) CVW-5
VAW-116 Miramar, Ca (E-2C) CVW-2
VAW-117 Miramar, Ca (E-2C) CVW-11
VF-1 Miramar, Ca (F-14A) CVW-2
VF-2 Miramar, Ca (F-14A) CVW-2
VF-21 Miramar, Ca (F-14A) CVW-14
VF-24 Miramar, Ca (F-14A) CVW-9
VF-51 Miramar, Ca (F-14A) CVW-15
VF-111 Miramar, Ca (F-14A) CVW-15
VF-114 Miramar, Ca (F-14A) CVW-11
VF-124 Miramar, Ca (F-14A) training
VF-126 Miramar, Ca (TA-4J, A-4F, T-2C) training
VF-151 Atsugi, Japan (F-4S) CVW-5
VF-154 Miramar, Ca (F-14A) CVW-14
VF-161 Atsugi, Japan (F-4S) CVW-5
VF-211 Miramar, Ca (F-14A) CVW-9
VF-213 Miramar, Ca (F-14A) CVW-11
VC-1 Barbers Point, HI (TA-4J, SH-3G)
VX-4 Point Mugu, Ca (F-4J/S, F-14A, F-18A, TA-4J)
FWS Miramar, Ca (F-5E/F, A-4E/F)
VAQ-34 Point Mugu, Ca (TA-7C, ERA-3B)

LIGHT ATTACK WING PACIFIC, LEMOORE, Ca

VA-22 Lemoore, Ca (A-7E) CVW-11
VFA-25 Lemoore, Ca (F-18A) CVW-14
VA-27 Lemoore, Ca (A-7E) CVW-15
VA-56 Atsugi, Japan (A-7E) CVW-5
VA-93 Atsugi, Japan (A-7E) CVW-5
VA-94 Lemoore, Ca (A-7E) CVW-11
VA-97 Lemoore, Ca (A-7E) CVW-15
VFA-113 Lemoore, Ca (F-18A) CVW-14
VA-122 Lemoore, Ca (A-7E, TA-7C, T-39D, O-2A) training
VFA-125 Lemoore, Ca (F-18A, TF-18A) training
VA-127 Lemoore, Ca (TA-4J, A-4F) training
VA-146 Lemoore, Ca (A-7E) CVW-2
VA-147 Lemoore, Ca (A-7E) CVW-2
VA-192 Lemoore, Ca (A-7E) CVW-9
VA-195 Lemoore, Ca (A-7E) CVW-9
VX-5 China Lake, Ca (A-6E, A-7E, A-4M, F-18A, AH-1T)

MEDIUM ATTACK/ELECTRONIC WARFARE WING PACIFIC, WHIDBEY ISLAND, Wa

VA-52 Whidbey Island, Wa (A-6E, KA-6D) CVW-15
VA-95 Whidbey Island, Wa (A-6E, KA-6D) CVW-11
VA-115 Atsugi, Japan (A-6E, KA-6D) CVW-5
VA-128 Whidbey Island, Wa (A-6E, TC-4C) training
VA-145 Whidbey Island, Wa (A-6E, KA-6D) CVW-2
VA-165 Whidbey Island, Wa (A-6E, KA-6D) CVW-9
VA-196 Whidbey Island, Wa (A-6E, KA-6D) CVW-14
VAQ-129 Whidbey Island, Wa (EA-6B) training
VAQ-130 Whidbey Island, Wa (EA-6B) CVW-2
VAQ-131 Whidbey Island, Wa (EA-6B) CVW-6
VAQ-132 Whidbey Island, Wa (EA-6B) CVW-7
VAQ-133 Whidbey Island, Wa (EA-6B) CVW-11
VAQ-134 Whidbey Island, Wa (EA-6B) CVW-15
VAQ-135 Whidbey Island, Wa (EA-6B) CVW-8
VAQ-136 Atsugi, Japan (EA-6B) CVW-5
VAQ-137 Whidbey Island, Wa (EA-6B) CVW-3
VAQ-138 Whidbey Island, Wa (EA-6B) CVW-9
VAQ-139 Whidbey Island, Wa (EA-6B) CVW-14

FLEET AIR WESTERN PACIFIC, ATSUGI, JAPAN

VC-5 Kadena, Okinawa (A-4E, TA-4J)
VQ-1 Agana, Guam (EA-3B, EP-3E)
VQ-1 Det Atsugi, Japan (EA-3B, EP-3E)
VQ-3 Agana, Guam (EC-130Q)
VRC-50 Cubi Point, Philippines (C-130F, C-2A, US-3A)
VRC-50 Det Atsugi, Japan (C-2A)

PATROL WINGS PACIFIC FLEET, MOFFETT FIELD, Ca

Patrol Wing One, Kamiseya, Japan
TDY aircraft at Agana, Cubi Point, Kadena and Misawa
Patrol Wing Two, Barbers Point, HI
VP-1 Barbers Point, HI (P-3C)
VP-4 Barbers Point, HI (P-3C)
VP-6 Barbers Point, HI (P-3B)
VP-17 Barbers Point, HI (P-3B)
VP-22 Barbers Point, HI (P-3B)
Patrol Wing Ten, Moffett Field, Ca
VP-9 Moffett Field, Ca (P-3C)
VP-19 Moffett Field, Ca (P-3C)
VP-31 Moffett Field, Ca (P-3A/B/C)
VP-40 Moffett Field, Ca (P-3C)
VP-46 Moffett Field, Ca (P-3C)
VP-47 Moffett Field, Ca (P-3C)
VP-48 Moffett Field, Ca (P-3C)
VP-50 Moffett Field, Ca (P-3C)
Det Adak, Adak, Ak
TDY aircraft from CONUS bases

DIRECT REPORTING UNIT

VRC-30 North Island, Ca (C-1A, UC-12B, CT-39E)

NAVAL AIR TRAINING COMMAND, CORPUS CHRISTI, Tx

Training Wing One, Meridian, Ms
VT-7 (TA-4J)
VT-9 (T-2C)
VT-19 (T-2C)
Training Wing Two, Kingsville, Tx
VT-21 (TA-4J)
VT-22 (TA-4J)
VT-23 (T-2C)
Training Wing Three, Chase Field, Tx
VT-24 (TA-4J)
VT-25 (TA-4J)
VT-26 (T-2C)
Training Wing Four, Corpus Christi, Tx
VT-27 (T-34C)
VT-28 (T-44A)
VT-31 (T-44A)
Training Wing Five, Whiting Field, Fl
VT-2 (T-34C)
VT-3 (T-34C)
VT-6 (T-34C)
HT-8 (TH-57C)
HT-18 (TH-57C)
Training Wing Six, Pensacola, Fl
VT-4 (TA-4J, T-2C)
VT-10 (T-39D, T-2B/C)
VT-86 (T-39D, TA-4J)
Flight Demonstration Squadron 'Blue Angels', Pensacola, Fl (A-4F, TA-4J, C-130F)

NAVAL AIR RESERVE FORCE, NEW ORLEANS, La

Reserve Carrier Air Wing Twenty, Jacksonville, Fl
Reserve Carrier Air Wing Thirty, Alameda, Ca
Helicopter Wing Reserve, North Island, Ca
Reserve Patrol Wing Atlantic Fleet, Norfolk, Va
Reserve Patrol Wing Pacific Fleet, Moffett Field, Ca
Reserve Tactical Support Wing, New Orleans, La

Reserve Carrier Air Wing Twenty (CVWR-20), Jacksonville, Fl
VF-201 Dallas, Tx (F-4S)
VF-202 Dallas, Tx (F-4S)
VA-203 Cecil Field, Fl (A-7E)
VA-204 New Orleans, La (A-7B)
VA-205 Atlanta, Ga (A-7B)
VFP-206 Andrews, Md (RF-8G)
VAK-208 Alameda, Ca (KA-3B)
VAQ-209 Norfolk, Va (EA-6A)
VAW-78 Norfolk, Va (E-2B)

Reserve Carrier Air Wing Thirty (CVWR-30), Alameda, Ca
VF-301 Miramar, Ca (F-4S)
VF-302 Miramar, Ca (F-4S)
VA-303 Alameda, Ca (A-7B)
VA-304 Alameda, Ca (A-7B)
VA-305 Point Mugu, Ca (A-7B)
VFP-306 Andrews, Md (RF-8G)
VAK-308 Alameda, Ca (KA-3B)
VAQ-309 Whidbey Island, Wa (EA-6A)
VAW-88 Miramar, Ca (E-2B)

Helicopter Wing Reserve (HelWingRes), North Island, Ca
HAL-4 Norfolk, Va (HH-1K)
HAL-5 Point Mugu, Ca (HH-1K)
HC-9 North Island, Ca (HH-3A)
HS-74 South Weymouth, Ma (SH-3D)
HS-75 Willow Grove, Pa (SH-3D)
HS-84 North Island, Ca (SH-3D)
HS-85 Alameda, Ca (SH-3D)

Reserve Patrol Wing Atlantic Fleet (ResPatWingLant), Norfolk, Va
VP-62 Jacksonville, Fl (P-3B)
VP-64 Willow Grove, Pa (P-3A)
VP-66 Willow Grove, Pa (P-3A)
VP-68 Patuxent River, Md (P-3A)
VP-92 South Weymouth, Ma (P-3A)
VP-93 Selfridge, Mi (P-3B)
VP-94 New Orleans, La (P-3A)

Reserve Patrol Wing Pacific Fleet (ResPatWingPac), Moffett Field, Ca
VP-60 Glenview, Il (P-3B)
VP-65 Point Mugu, Ca (P-3A)
VP-67 Memphis, Tn (P-3A)
VP-69 Whidbey Island, Wa (P-3A)
VP-90 Glenview, Il (P-3B)
VP-91 Moffett Field, Ca (P-3B)

Reserve Tactical Support Wing (ResTacSupWing), New Orleans, La
VC-12 Oceana, Va (TA-4J, A-4F)
VC-13 Miramar, Ca (TA-4J, A-4E)
VR-46 Atlanta, Ga (C-118B)
VR-48 Andrews, Md (C-131H)
VR-51 Glenview, Il (C-9B)
VR-55 Alameda, Ca (C-9B)
VR-56 Norfolk, VA (C-9B)
VR-57 North Island, Ca (C-9B)
VR-58 Jacksonville, Fl (C-9B)
VR-59 Dallas, Tx (C-9B)
VR-60 Memphis, Tn (C-9B)
VR-61 Whidbey Island, Wa (C-9B)

The Lockheed P-3 Orion performs all the shore-based anti-submarine and patrol work for the US Navy. It has been constantly updated since its introduction and is a highly capable weapons platform able to deliver Harpoon and anti-ship Tomahawk missiles.

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14